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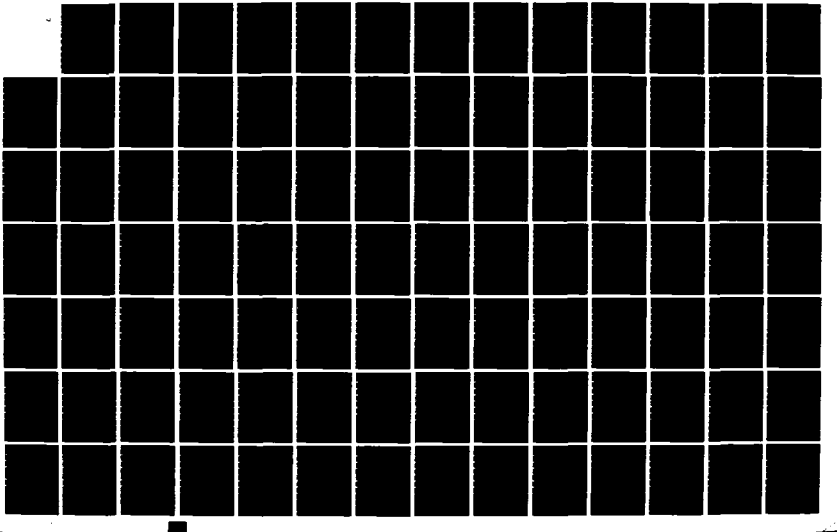

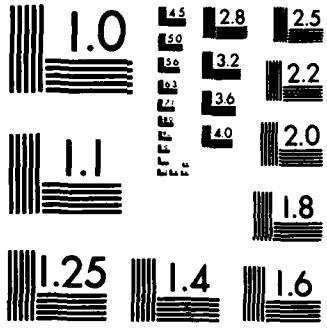

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A COMPARATIVE EVALUATION OF THE THESAURUS OF ENGINEERING AND SCIENTIFIC TERMS AND THE DDC RETRIEVAL AND INDEXING TERMINOLOGY

A D JONES, B.Sc.

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A thesis submitted in partial fulfilment of the requirements for the degree of M. Sc. in Information Science City University, London

November 1977

Alan David Jones B.Sc.

ACKNOWLEDGEMENTS

I wish to thank the Ministry of Defence (Procurement Executive) for their support of this work, and the technical staff of the Defence Research Information Centre for their assistance in the indexing exercise.

Thanks are also due to Barbara Kostrewski for helpful advice and discussions, and to Christine Brown for typing the manuscript.

Lastly, but by no means least, I wish to thank my wife Margaret for her encouragement and patience throughout the course of this work.

ABSTRACT

A comparative evaluation has been undertaken on the DDC Retrieval and Indexing Terminology (DRIT) and the Thesaurus of Engineering and Scientific Terms (TEST). The study examined the hierarchic structure of both thesauri and their lead in terminologies, and the specificity of terms in each thesaurus was compared. A comparison was made of the index terms assigned to a number of abstracts, using each thesaurus, and these terms were also compared with free language terms assigned by the ASSASSIN computer program. It was found that TEST, with its greater number of preferred terms, was the more specific indexing terminology, but DRIT gave the better guide to the selection of a preferred term by virtue of its larger number of lead in terms.

CONTENTS

1 Introduction

Technical reports held by the Defence Research Information Centre (DRIC) are indexed using descriptors selected from the Engineers Joint Council - Department of Defense Thesaurus of Engineering and Scientific Terms (TEST) (18).

Occasionally the need arises to index a concept which is not included in TEST's structure, neither as a preferred term nor as a term with a USE reference. In these circumstances three courses of action are open to DRIC indexing staff. First of all an existing TEST term may be used if it can be considered a synonym for the required concept, or at least is related to it in some way, and will describe the concept sufficiently for the purposes of retrieval. If this procedure is considered inadequate then groups of two or three descriptors may be assigned on a precoordination basis. When this expedient fails, DRIC indexers discuss the need for a new descriptor and introduce a new term into the system, if this is agreed to be necessary.

In 1974 the preliminary edition of the DDC Retrievel and Indexing Terminology (DRIT) (15) was published, together with an addendum containing the hierarchical structure of the thesaurus (16). This publication aroused immediate interest in DRIC especially as it was learned that there were no plans to up-date, or issue addenda to TEST. It was thought that DRIT, being a more recent publication, might perhaps handle new concepts more adequately than TEST, and may even be a possible replacement for TEST.

The most obvious feature of DRIT is the predominance of terms having a USE reference, and the use of precoordination to describe concepts which are not represented by a single descriptor. This

suggested that DRIT may be a useful guide to precoordination, and in some cases it has been possible to precoordinate terms from TEST by referring to DRIT to determine whether it handles the required concept and in what way.

The first edition of DRIT (17) was published in January 1975 in two volumes, with the hierarchical structure included in volume 2 and not published separately as with the preliminary edition. With the publication of this edition it was decided to evaluate the TEST thesaurus against DRIT, using the following terms of reference as a broad guide to the investigation:

1 Determine which thesaurus has the more specific indexing terminology, and gives the better guidance to the selection of preferred indexing terms, expecially for new concepts.

2 Determine which thesaurus produces the better retrieval results on DRIC's holdings.

3 Outline any problems which may arise if TEST is replaced by DRIT, ie how compatible are the two systems?

As both thesauri are multidisciplinary it was decided to restrict the study tothe field covered by the COSATI subject area of Military Science. Equivalent hierarchical structures from each thesaurus were selected from this subject area and their structural characteristics were compared. Also terms from these hierarchies were examined for specificity. To augment the latter work documents were indexed using each thesaurus and the index terms from each system were compared, and the compatibility of the two thesauri was determined from this. Alongside this study the documents were also indexed

by the ASSASSIN program in order that terms selected from the titles and abstracts of the documents could be compared with terms selected from the two controlled indexing languages.

DDC Retrieval and Indexing Terminology (DRIT)

The first edition of DRIT is in two volumes and contains 1,959 pages of indexing terms plus a hierarchy (17). There is no indication of how many terms are presented, so the first task was to determine this. Table 1 (see Appendix 1) shows the calculation, which gives a total of 91,970 entries, of which just 10,198 are preferred terms leaving a massive total of 81,772 terms with a USE reference. This gives a ratio of 1:9 preferred terms:lead in terms. TEST has 17,810 preferred terms and 5,554 USE terms, giving a ratio of 1:1.3 preferred terms:lead in terms.

As table 1 shows, the calculation of the number of terms in DRIT was made by counting the number of terms on 20 pages selected at random throughout the thesaurus, followed by simple arithmetic.

The first and most obvious comparison between the two thesauri is that TEST has the greater number (74.6% more than DRIT) of preferred terms, while DRIT is overwhelmed with lead in terms. These terms in DRIT, however, include such things as spelling variations and the use of hyphens. For example; the preferred term in DRIT is SURFACE TO AIR MISSILES, but lead in terms for this descriptor include GUIDED MISSILES (SURFACE TO AIR), SAM, SAMS, SURFACE-TO-AIR MISSILES, SURFACE TO AIR MISSILE and SURFACE-TO-AIR MISSILE (both the latter being singular terms, while the preferred term is plural.)

Many of the USE references in DRIT refer the user to more than one preferred term, for example, Nuclear weapon effects USE Nuclear weapons and Weapons effects. This use of precoordination forms the basis of many of the USE references in DRIT.

3 Literature Review

3.1 The Nature of Relations between Terms

Relations between terms are divided into two types, paradigmatic and syntagmatic. Foskett (23) defines paradigmatic relationships as those which are known in advance of scanning a particular document, and syntagmatic relationships as those which are found only by scanning the document.

Paradigmatic relationships show the various aspects of genus-species relation and form the basis of hierarchical structures and other relations, while syntagmatic relationships are those which give rise to synthesis. For example, the combination of the terms Heat treatment and Aluminium forms a syntagmatic relationship which indicates the subject "heat treatment of aluminium". From this it can be seen that syntagmatic relations are directional, the combination of Aluminium and Heat treatment is not the same as the first combination. This directionality of syntagmatic relations becomes more obvious in the two headlines "Dog Bites Man" and "Man Bites Dog".

Stokolova (71) defines the functions of paradigmatic relations such as consequence → cause and material or process → properties or characteristics as being analogous to the function of the relations species → genus. This latter relation appears in thesauri as Broad Term → Narrow Term (BT → NT), ie the hierarchic structure of the thesauri, while the cause → consequence, whole → part and material → property relations form the cross references or Related terms (RT). Whole-Part relations are sometimes in evidence in hierarchic relations also.

Gilchrist (24) defines syntagmatic relations as those holding between elements forming serial structures at a given level, referable to, though not identical with, the temporal flow of utterance or linear stretches of writing. As an example he quotes the topic "Effect of fertilizer on the Vitamin B content of Wheat" in which the three principal concepts, fertilizer, vitamin B and wheat are syntagmatically related.

3.2 Comparison and Evaluation of Thesauri

Very little work has actually been performed on evaluating one thesaurus against another. Willets (76) examined the relations between terms in thesauri and compared the ways in which these relationships are derived in 10 different thesauri. No consistent patterns were found between the thesauri in the use of related terms (RT). Hierarchic relations, broad and narrow terms (BT, NT), were mainly based on generic and part-whole relations. Willets also found that scope notes and parenthetical qualifiers were used in most of the thesauri where necessary to clarify meaning.

Subramanyam (72) outlines his criteria for comparing thesauri and then simply rates each thesaurus against these criteria, with the rider that not all criteria are applicable in each case. Subramanyam's criteria are given under the broad headings Facet analysis, Terminology Control and Notation.

Vickery (75) outlines criteria for comparison of indexing terminologies in more detail:

(1) What is the basic form of the terminology - alphabetic or systematic?

(2) How is an individual term located in the scheme?

(3) How many terms are there in the scheme?

(4) How specific are the terms? (This is a relative question.)

(5) Does the terminology include compound terms, phrases of two or more words, and, if so, are there rules governing their admission?

(6) To what extent are word forms (singular and plural, words with the same root) confounded or kept separate? Are there rules governing this?

(7) How are homographs of different meaning treated?

(8) Is the use of some terms limited by scope notes or definitions?

(9) To what extent are synonyms and near-synonyms confounded?

(10) If synonyms and near-synonyms are barred, are they listed in the terminology as lead in words? How many such lead in words are there?

(11) Are links made between a general term and those specific to it? If so, what is the average number of links in a hierarchy? How many terms on average are linked into a single hierarchy? To what extent do terms form part of more than one hierarchy?

(12) Are links made between terms related in ways other than genus to species? What other relations are included?

(13) How are links between terms displayed? What is the average number of links per term?

(14) If coding is used, what purpose does it serve?

This methodology covers all Subramanyam's criteria, but does not indicate how to measure specificity. As Vickery indicates (see point 4 above) this is a relative question. A method of comparing classification systems by comparing the specificity of the systems is described by Hopker (27). Hopker's method is to order each class in a group according to rank and class size. The rank of a class is determined by an arbitrary method of counting the number of terms in that class which have a given number of terms beneath them in the classification scheme. Hopker's arbitrary number of terms is 10. The class with the highest number of such terms is assigned a rank of 1, the next highest 2 and so on. A graph of class size against rank plotted for the classification systems being compared will in this way allow a direct comparison of specificity.

Although this method of comparison is completely arbitrary, all the systems being compared are subjected to the same degree of arbitrariness, so Vickery's question of relativity does not arise.

Although Hopker's method was applied to classification systems, it can be used on the hierarchical structure of thesauri. As these hierarchies tend to be smaller than classification schemes, the arbitrary figure needs to be lower.

3.3 Comparison of Indexing Language Performance

The most common method of comparing indexing languages is to measure their performance in information retrieval. Precision and recall are often used as the yardsticks by which performance is measured (7, 8, 24, 46, 53, 64, 66, 74) while links, roles and other factors are introduced to assess their effect on these yardsticks (46, 47, 53, 66, 74).

Much of the practical work in this field has not compared like with like. Montague (48) compared two coordinate indexing systems and a classification scheme, and found that the coordinate indexing systems permitted quicker retrieval and produced more relevant references than did the classification scheme.

Cleverdon (7) in the first Cranfield test compared Facet Analysis, UDC, Uniterms (a free text indexing language system) and alphabetical subject headings. In this test Cleverdon found that the alphabetical subject headings produced the most efficient system, but the specificity of the terms was important. However, in later tests (8) Cleverdon et al found that a natural language system was more effective than controlled terms. For the natural language system normalised recall was 65.00 per cent, while the best figure for controlled terms was 61.76 per cent. In practise these figures are so close together, that to say one system is better than the other is a subjective evaluation.

Operating Systems Inc (59) evaluated structured and free text searching of the NHTSA Data Base. Their results show that there is no significant difference in retrieval effectiveness of the two systems, but the free text system had considerable advantages.

Salton (65) achieved better retrieval results with his SMART system of automatic text processing than he did with a conventional controlled terminology retrieval system (MEDLARS). The initial precision and recall figures using (i) the SMART automatic discriminator dictionary and (ii) the SMART thesaurus were close to the figures for the MEDLARS search. User feedback caused a significant increase in these figures for both the SMART systems, but the difference between the two sets of figures was small, so that Salton concluded that no technical justification appears to exist for maintaining controlled manual indexing in operational retrieval environments. However, no feedback procedures were attempted on the MEDLARS system, as this facility was not built into the process. This in effect gave a biassed result in favour of the SMART system and one wonders what the results would be if equivalent feedback procedures had been used on MEDLARS to allow a fair comparison of the two systems.

Hutchins (31) asserts that natural languages perform as well as, and sometimes better than controlled languages in information retrieval. But he maintains that it is an open question as to why this is so. Lancaster (43) gives more positive reasons for this by pointing out that an uncontrolled vocabulary can be more specific than a controlled vocabulary in

searching, as particular concepts can be searched rather than general. As an example Lancaster offers the term Lung diseases as a generic term under which a thesaurus may subsume all terms for specific lung diseases, thus losing the capability of retrieving only documents relating to a specific disease.

Lancaster also states that a natural language system will have great flexibility in searching, since any term class which is formed at the input stage (by control of synonyms or establishing of hierarchies) can equally well be formed at the time of searching. According to Lancaster, this means that a controlled vocabulary can be developed which is only used as a searching aid. He further states that any existing thesaurus is potentially of value in a natural language search.

Hutchins (31) agrees that some form of vocabulary control is useful.

Lancaster (48) points out that the flexibility of being able to form classes at the time of searching is lost to a controlled vocabulary because the classes will be rigidly established by the vocabulary's structure.

To evaluate the effectiveness of a system, Keith (36) points out that it is necessary to consider the operational characteristics of the system relative to the information needs. The probability that a system will have exactly the characteristics the user requires is low, and the answer will have to be a compromise.

3.4 The Intermediate Lexicon and Thesaurus Reconcilliation

Incompatibilities between thesaural systems arise from differences in the selection and form of the keywords used in the different systems. Two methods of relating one thesaurus to another have been developed.

Horsnell (28) describes the Intermediate Lexicon, a switching language device which facilitates the exchange of subject information between different centres using different thesauri, the Intermediate Lexicon being used to relate equivalent terms in different thesauri.

The use of switching languages such as the Intermediate Lexicon is described by Coates (9). All terms in one thesaurus are related to an equivalent notation in the switching language, and by this to equivalent terms in all other thesauri related to the intermediary.

A similar end is sought by Neville (56, 57) by means of Thesaurus Reconcilliation. This again relates terms to their equivalents in different thesauri, but without the use of an intermediary. The necessary coding is applied to the terms in each thesaurus in the system.

Both these systems are related to the present work in that they both seek equivalence between thesauri, and both could form the basis of an evaluation scheme. As well as comparing one thesaurus to another on the basis of equivalent terms, both the Intermediate Lexicon and Thesaurus Reconcilliation schemes would highlight other areas, such as where a term in one

thesaurus does not appear in antoner. In this way the degree of compatibility between the thesauri could be ascertained.

The degree of equivalence between the thesauri would be a useful guide to the comparison of the structure of thesauri, and to the specificity of terms. Thus one term in one thesaurus may appear as a USE reference in anotner, this USE reference being a more generic term. Both the Intermediate Lexicon and Thesaurus Reconcilliation indicate such occurrences.

3.5 Thesaural versus Free Text Indexing

There are arguments for and against both thesaural and free text systems. McArther (50) maintains that the major defect in thesauri is grouping without adequate contrasting definition within groups, and that their major virtue is that they contain some attempt at association of ideas, primarily on principles of inclusion, synonymy and antonymy.

Natural language usage is more common in automated systems, as in the work of Klingbiel (39) and Montgomery (54).

Aitcheson and Gilchrist (1) point out at once the advantages and disadvantages of free text indexing. It makes life simple at the indexing stage, but introduces problems in retrieval, because the searcher must allow for all variations and synonyms of the indexing term in question.

The National Technical Information Service (NTIS) (55) maintain that a controlled vocabulary is important for information retrieval, to such an extent that a new microthesaurus in the field of environmental science was created for use on the NTIS

data base. Previously, to search this particular subject area, it was necessary to use not only free language terms, but keywords from four thesauri - these being the Department of Defense thesaurus, the Energy Research and Development Administration thesaurus, the National Aeronautic and Space Administration (NASA) thesaurus and a controlled free language list. The new microthesaurus was evolved to cope with this problem and integrates hierarchically the vocabulary of the different sources to allow easier retrieval of environmental reports.

Pickford (60) points out that structuring can be as simple as an alphabetic listing. Moving on from here, Pickford argues that a structured thesaurus should produce consistency of indexing and aid search formulation, but that using an unstructured system can lead to economy in terms of minimal intellectual effort, and simplicity for certain classes of user, eg non information workers.

Other arguments put by Pickford for structuring are that:

(i) it leads to consistency of indexing, but it has been challenged that this is a good thing;

(ii) it aids search formulation;

(iii) it can serve as a memory aid;

(iv) it acts as a guide to the use and understanding the information system.

Pickford also describes problems that have arisen by using unstructured languages, the biggest problem being the difficulty in formulating searches because the inconsistency of indexing

means that users have to look in several places for their search terms. This is exactly the problem encountered by NTIS (55) above.

The opposite view is expressed by Farradane et al (22) who say that using a structured system of storing information for later retrieval can lead to situations in which relevant items are not retrieved because of technicalities of the system.

The DDC Retrieval and Indexing Terminology (14) grew from an unstructured data base. The growth of this Natural Language Data Base (NLDB), is described in reports by McCauley (51) and Klingbiel (44, 45). Alongside this work a technique for machine aided indexing using the NLDB has been developed. This is also described in several reports by Klingbiel (38, 39, 40, 41, 42, 43).

Klingbiel maintains that for information retrieval highly structured controlled vocabularies are obsolete and the natural language of scientific prose is fully adequate for this purpose (39).

3.6 Structure, Development and Maintenance of a Thesaurus

The word thesaurus has been defined in several different ways. Davis (12) feels that the word now often means nothing more than an alphabetical listing of computer terms, while Hines and Harris (26) feel that a thesaurus is an indexing language, rather than a glossary or dictionary of a field. Gilchrist (24) offers a definition which helps to distinguish between a thesaurus and

an information retrieval or indexing language term list. A thesaurus is an authority file which can lead the user from one concept to another via various heuristic or intuitive paths. A term list is simply an authority file which presents a straight list of terms. Gilchrist quotes Howerton's definition of an authority file as being a structured collection of concept descriptions by means of which a body of knowledge is classified, controlled and searched (29). As Pickford (60) points out, structuring can be as simple as alphabetic listing.

Pickford (59) also defines the difference between an information retrieval language and a thesaurus. The first, he maintains, is simply what it says it is - a language for use in the retrieval of information, and can be thought of as a list of descriptors which cover a particular subject area. A thesaurus however is a complex lexicon, comprising both an indexing and information retrieval tool, which includes not only a list of keywords but a guide to the use of the keywords.

In his model, Turski (73) assumes that in a thesaurus, no two descriptors are synonyms and that for each unrequired term there is a synonymous descriptor. This ideal situation is unlikely to be achieved in practise because, as Aitcheson and Gilchrist point out (1), many words have synonyms which are localised in their use, and some synonyms are simply out of date terminologies, such as the electrical term "capacitor" which has replaced the earlier term "condenser". A lead in terminology cannot take all such variations into account without becoming unwieldy.

Subramanyam (72), Braun and Schwind (6) and Rolling (63) all state that the basic function of a thesaurus is to bring together the language of the author, the indexer and the enquirer.

Lancaster (48) takes the view that a controlled vocabulary exists primarily to control synonyms, near synonyms and homographs, and to provide sufficient hierarchical structure to allow the conduct of generic searches. Lancaster also feels that a controlled vocabulary must be synthetic, ie provide facilities for combining terms to represent any subject. The same requirements are outlined by Jones (33) and Soergel (68) who also takes the view that homographs and homonyms as well as synonyms must be catered for.

The importance of controlling synonyms has been demonstrated by Bottle (5) and others. In studies Bottle found that one third or more of indexing terms were not found in document titles, but were synonyms or related terms. In particular the literature of chemical compounds and biological systems included a high proportion of synonyms. On the matter of synonyms Lancaster and Fayen (49) state that a controlled vocabulary establishes which of several synonyms or near synonyms will be used as preferred terms, and provides references to this term from the possible variants.

Haines (25) and Lancaster and Fayen (49) define three other tasks performed by a thesaurus. It guides users to preferred terms by means of an entry vocabulary (lead in terms), it links together terms that are hierarchically related, and links related terms by cross references; and finally, a thesaurus distinguishes homographs.

On the subject of lead in terms Rolling (17) asserts their numbers should be kept as low as possible, as it seems senseless to overburden a thesaurus with unpermitted terms.

DRIT (17) provides a good example of a thesaurus which does not follow this rule. As stated in chapter 2 many of the lead in terms in DRIT are simply minor variations in spelling of the preferred term. Rolling's point is that only those terms which are not obvious synonyms should be used on lead in terms, such as this example from TEST: Cockroaches USE Blattidae.

Generally a thesaurus is generated because existing thesauri do not adequately cover the field required. The Low Intensity Conflict thesaurus described by Deacon and Harvey (13) was developed for this reason. The range of indexing terms in TEST did not always adequately describe the subject material, so the new thesaurus was based on the relevant descriptors in TEST, adding terms as they were required. NTIS (55) prepared their environmental microthesaurus to bring together the different index term sources already in existence.

TEST (18) began life as Project LEX, a thesaurus developed by a committee. Over 300 engineers, scientists, technical information and library specialists were involved in the work, totalling over 1500 working days between them in the compilation. The ASTIA Thesaurus (2) which is similar in composition to TEST was compiled by the Armed Services Technical Intelligence Agency in collaboration with the US Department of Defense. In this context, this thesaurus can be regarded as a forerunner of both TEST and DRIT, which, as noted earlier, is a computer compilation (17).

Keevil (35) describes a method of building a thesaurus in which candidate indexing and lead in terms are selected from documents as indexing proceeds. This procedure is the one most often used for maintenance and updating of thesauri. Kim (37) maintains that there are few rules and conventions for updating thesauri, and for this reason most thesauri are not systematically updated, if they are updated at all. As Schirmer (67) points out, a thesaurus will require updating as and when new concepts appear in the technical literature.

3.7 Precoordination and Postcoordination

Coordinate indexing is the process of combining concepts to define a subject. It is useful to distinguish between precoordingation and postcoordingation by means of the definition provided by both Lancaster (48) and Foskett (23).

Precoordination is the combination of separate concepts at the time of indexing, while postcoordination combines separate concepts at the time of retrieval.

According to Foskett (23) precoordinate indexing terminologies include most of the major classification schemes such as UDC, the Dewey Decimal Classification, Ranganathon's Colon Classification, the Bliss Bibliographic Classification and the Library of Congress Classification.

Willets (76) found that many thesauri include precoordination of terms in their structure, producing multiword descriptors. Some of these descriptors are heterogeneous terms but the majority are entries qualified by adjectives, such as Hydraulic

mining and subsurface drainage. Here Willets is using the term precoordination to describe preferred terms which consist of two or more words or a phrase. Generally precoordination and postcoordination are connected with the flexibility of a thesaurus to synthesise concepts by the coordination of existing subjects. The more a thesaurus relies on fixed precoordination along the lines of, for a use b plus c, the less flexible it will be.

3.8 Specificity and Exhaustivity

Foskett (23) defines specificity as the extent to which an information system permits the user to be precise when specifying the subject content of a document and exhaustivity as the extent to which a given document is analysed to establish what subject content is to be specified.

Higher specificity leads to higher relevance, but at the expense of recall, whereas an increase in exhaustivity increases recall at the expense of relevance. There is little point in increasing exhaustivity unless the specificity is available, ie in depth indexing will not give improved access to the contents of a document unless the required additional indexing terms are specific.

Vickery (75) points out that it is important to match the specificty of index terms to the kinds of query that the information system has to meet. In retrieval, low specificity will lead to noise, whereas too high a specificity may miss relevant items unless all the necessary specific terms are used.

Aitcheson and Gilchrist (1) confirm that specificity controls the precision capabilities of an information system, but also demands greater skill in indexing and searching. They also point out that the disadvantage of a highly specific vocabulary is that the number of index terms required for the system is increased and it is consequently more expensive to compile, maintain and operate.

3.9 Semantic and Syntactic Aspects

Jones (33) defines three requirements of thesaural systems. These requirements are:

1 a basic syntax capable of differentiating between various word functions;

2 a set of semantic relationships capable of introducing structure by eliminating synonyms, by linking words generally and by differentiating between compound forms;

3 an appreciation of the structure which emerges from, or is imposed upon a topic covered by a thesaurus.

These requirements should be compatible with the microstructure of the system.

Farradane (21) covers similar ground when he writes that it is necessary to overcome various types of ambiguity, synonyms, homonyms, jargon and even illiteracy. The human being is able to overcome errors and deduce meaning using cues of context, emphasis, gesture and knowledge, but even taking all this into

account, two persons may derive different meanings from the same text. He also points out (19) that relations between concepts often appear to be absent, but states that a relation between terms is implied if they are used to index the same document. While this implied relationship will be absent from a thesaurus, it is a valid related term concept in any indexing system.

Braun and Schwind (6) argue in a similar vein that a semantically oriented index offers a more precise system than other methods, and will help exclude bad terms from the terminology. Semantic methods can be used to obtain phrases intended by the text which is to be indexed, and syntactic methods must be used to avoid errors and resolve ambiguities.

Austin (3) in his history of the development of PRECIS describes the semantic aspects of the system. One of the rules states that two terms should not be written as adjacent components of a string if the first serves only to establish the class of concepts to which the second belongs. For example, if the string contained the terms Rodents and Rats adjacent to each other, then the first term would be excluded on the grounds that rats are, by general definition, a kind of rodent. In this way the most specific indexing term is used and generic terms and near synonyms are excluded.

Lancaster and Fayen (49) discuss the automatic syntactic analysis methods which are included in some automatic systems. These systems determine structural dependencies between words in a sentence in the form of an abstract graph or tree in which each word forms a node in the tree and the syntactic

dependencies are represented by branches. Automatic syntactic analysis of this type will yield a machine readable system capable of producing extremely high levels of search precision, because it allows the user to specify the exact relationships existing between words in document text as well as the words occurring in request statements. Syntactic analysis of this type may be needed for fact retrieval or question - answer systems, ie systems that attempt to provide a direct answer to a question rather than retrieving a piece of relevant text.

Semantic factoring can be a useful device for handling new concepts if this does not produce noise, ie the factor combination must not already be in use for another concept. In this instance, Blagden (4) feels that it is worthwhile introducing a new term.

The subject of compound words and semantic factoring was studied by Jones (34). His conclusions are that difficulties are caused if compound words are factored the wrong way, and that it is necessary to know the syntactic origins of words so that correct semantic factoring can be made.

Fracturing all compound words can lead to noise in retrieval. One suggestion that Jones studied is to use a single word synonym in place of the compound where one exists. Failing this the compound term should be used where the parts have lost separate meaning or where the meaning would be affected if the compound is fractured.

To handle words which have more than one semantic meaning and homographs, Willetts (76) suggests that scope notes or parenthetical qualifiers are necessary to define meaning. For example, the term Tanks would have to become Tanks (combat vehicles) or Tanks (containers).

According to Farradane (20) semantic analysis is generally inadequate and is patched up by equally haphazard devices such as links and roles and generic posting, which often only offers a selection of different possibilities of higher term. Generic posting is a useful device for broadening a search, but as Blagden (4) points out, this will improve recall at the expense of relevance.

3.10 Links and Roles

Links and Roles are devices intended to overcome false coordinations and incorrect term relationships, by labelling groups of associated terms, or indicating the roles of terms, and are a controversial issue. Farradane's opinion of them has already been seen (20).

Lancaster's opinion (47) is that they help reduce noise, but more specifically he feels that although role indicators are intended to improve the specificity of an index language and thus the precision of a search, they cannot improve recall. In fact, because they define classes more precisely, role indicators will actually reduce recall (46).

In tests, Van Oot et al (74) found that links and roles produced a marked increase in relevance, but roles blocked relevant retrieval if they were not used consistently in indexing and searching. Where they were used consistently, roles reduced false drops. On this subject, Farradane (20) feels that false drops and other noise reflect partly a lack of word control and partly a lack of semantic control. He also maintains that tests on links and roles give conflicting results.

In other tests, Montague (53) found that links and roles improved relevance by reducing false retrieval. This corresponds with Van Oot's findings. Montague also found that syntactic controls made a high level of relevance achievable, as did deep indexing, vocabulary control and provision for generic as well as specific searches. Half of the references missed in Montagues tests were due to indexing errors and insufficient depth of indexing.

Taking the opposing view, Saracevic (66) avers that syntactic features of indexing languages such as links and roles do not reduce the overall retrieval of non-relevant answers, except in rare instances. Saracevic's opinion is that more relevant answers can be achieved by making broader searches, but that this will introduce much more non-relevant material. Jones (40) agrees that links and roles have been judged to have doubtful value, but he says that they do substantially reduce noise. Hutchins (30) believes that links have some use in that they can indicate how terms are partitioned between two topics. Mandersloot et al (52) maintain that homographs do not

necessarily need roles or other codes to clarify meaning, as the combination with other terms will usually define the meaning of the selected homograph. For example, the combination of Tanks, Guns and Tracked vehicles is sufficient to indicate that the term Tanks refers to a combat vehicle rather than a water container.

3.11 Readability

No references to work on this subject were found relating to thesauri but two reports by Spencer et al (69, 70) present several conclusions which are of interest.

It is generally agreed that a text comprising a mixture of upper and lower case letters is much easier to read than an all upper case text. This is borne out by Spencer et al. In tests they found that for readability, a text in all upper case was not worth considering.

In their tests on spatial and typographic coding in bibliographic systems, they found that having a space between entries, together with making the first element of an entry distinctive from the rest of the text provided the most readable and effective system. The first element could either be in a bolder type or physically stand out from the surrounding text.

3.12 Conclusions

From the foregoing it is possible to list the following requirements of a thesaurus:-

1 The thesaurus must provide adequate coverage of the subject area it refers to. To this end sufficient preferred terms are needed to cover all concepts connected with the subject, together with a lead in terminology which will direct the user to the correct preferred term. For a small thesaurus this causes few problems, but in the case of thesaurus covering a wide subject area, or a multidisciplinary thesaurus, there will almost certainly be conspicuous gaps. This has already been seen in the Low Intensity Conflict Thesaurus developed by Deacon and Harvey (13), where TEST (18) did not adequately cover this field but part of TEST was used as the basis of a thesaurus dealing with a more specific subject area.

2 Generic relations between terms should be displayed in a hierarchy, to enable generic posting and search broadening to take place. Cross references to related terms should be shown.

3 There should be some sort of terminology control to handle synonyms, antonyms, homonyms and homographs, together with a lead in vocabulary to guide the user to a preferred term. In this context it is useful to bear in mind Rolling's view that it is senseless to overburden a thesaurus with unpermitted terms (57)

4 Some provision should be made for syntnesis in order that new concepts and compound words can be handled by the thesaurus.

5 Ideally the thesaurus should have both literary and user warrant. The thesaurus should be easy to read and to use for it to be readily accepted by users.

Vickery's criteria (75) can be used as guidelines for the start of an evaluation of thesauri (see section 3.2). From this list a basic scheme can be derived:

1 Compare the basic form of each thesaurus and the means by which individual terms are located in the thesauri. The number of terms in each thesaurus should be compared and those terms common to each be determined. In the present work, both thesauri are alphabetically structured and only a terminology comparison is required.

2 Examine the semantic and/or syntactic methods by which each thesaurus controls vocabulary, in particular synonyms, antonyms, homonyms and homographs. Also the use of compound terms, and phrases with two or more words, as preferred terms should be studied along with any rules governing the admission of these terms.

3 Evaluate the lead in vocabulary of each thesaurus in conjunction with synonym control etc. The number of such terms is important, especially if variations in spelling are used as alternative lead in terms.

4 The hierarchical structure of each thesaurus, if such a thing exists, should be compared and the use of relations other than hierarchic, between terms should be looked into.

5 How specific are the terms in the thesauri? As Vickery says, this question is subjective, but Hopker's method can be used to compare specificity and eliminate bias.

6 Ideally the performance of each thesaurus in a retrieval situation should be tested. It would be educational to use one thesaurus for indexing and the other for retrieval. This would show to what extent the two systems were compatible. Also it would be possible to obtain users opinions on each thesaurus after such an exercise. This would highlight any deficiencies in the systems.

4 Programme of Work

1 Define the subject area to be studied. In work on multi-disciplinary thesauri such as TEST and DRIT it is impractical to cover the whole subject field. For this reason, it was decided to limit the study to a subject area coming broadly under the heading "Military Science".

2 Compare the hierarchic structure of each thesaurus and the use of cross references to related terms. This task simplifies to a study of the hierarchy because while TEST has broad term (BT), narrow term (NT) and related term (RT) cross references, DRIT only uses broad and narrow terms.

3 Compare the lead in terminologies of each thesaurus.

4 Compare the provisions made for synthesis in each thesaurus. In some instances, this will coincide with item 3 because where a term is not used as a preferred term, some guidance to a suitable term, or combination of terms, to use in its place is necessary.

5 Compare the specificity of each thesaurus.

6 Compare the indexing terms applied to reports by using each thesaurus, and compare each set to terms produced by the ASSASSIN program.

7 Obtain users reactions to each thesaurus. This will be subjective, and allowance will have to be made for the fact that users know TEST and DRIT will be new to them.

5 Definition of Subject Area to be Studied

5.1 Introduction

As noted in chapter 4, it was decided to confine the subject area to the field of Military Sciences, which is field 15 of the COSATI subject category list (14). The actual subject area was defined by constructing a broad outline model of the field (see Figure 1, Appendix 1). This was achieved with the aid of the COSATI subject category list (14), Janes Weapons Systems (61) and personal knowledge.

5.2 The model

As can be seen from Figure 1, the subject area as defined by COSATI field 15 has not been strictly adhered to, and parts of other COSATI fields have been interpolated. In particular, field 16, Missile Technology has been incorporated as being related to Nuclear Warfare.

The model is not exhaustive and is simply a personal viewpoint to define subject areas of interest. The relations shown between terms in the model are not based on the structure of either thesaurus, but have been developed as the model grew. The intention here was to avoid any bias towards TEST or DRIT in constructing the model. It would be a simple matter to prepare a much larger, more detailed model incorporating more concepts. The size of the present model was dictated mostly by the limitations of space available on one page. After taking the seven main subdivisions of COSATI field 15-00, the model emulated Topsy and "just growed".

Most of the subjects included can be recognised as being included in hierarchies in both thesauri, while a few are isolated terms.

The solid lines on the model connect those subjects which may be expected to be generically related, the arrows indicate the direction from general to specific ie the movement down a hierarchy. Broken lines are used to indicate other relations which may be expected to exist between terms. For example surface to underwater missiles may be considered as being a related term to torpedoes (and vice versa), although the two items are not generically linked.

Having defined a subject area it was decided to utilize the hierarchies from both thesauri which included the following subjects, for further study:

Antipersonnel agents

Biological warfare

Bombing

Camouflage

Chemical warfare

Clothing

Defence

Flares

Intelligence

Logistics

Military facilities

Military operations

Military organisations

Missiles

Reconnaissance

Security

Strategy

Surveillance

Warfare

These hierarchies are reproduced in Appendix 2. The top term in a hierarchy is shown furthest left, while hierarchical steps are indicated by successive indentation. Terms at the right of the table indicate other hierarchies which include the term opposite.

6 Comparison of TEST and DRIT

6.1 Hierarchic Relations

This section was confined to a study of hierarchic relations, ie Broad Term (BT) and Narrow Term (NT) relations, because DRIT does not indicate other types of relationships. TEST includes cross references to Related Terms (RT).

The first point of interest is the close similarity between the two hierarchic schemes. This similarity is reflected in the rank number relations derived for the two structures (see section 6.3).

The most obvious difference is in the grouping of subjects in the hierarchies. While the individual hierarchies in TEST tend to be short, DRIT groups several subjects into one long hierarchy. As a result of this TEST seems to be outnumbered so additional hierarchies to those originally chosen were selected from TEST to correspond with the additional subjects included in the Military facilities, Military organisations and Warfare hierarchies of DRIT.

Many of the terms in DRIT's hierarchic structure appear in more than one hierarchy, to such an extent that most of the terms in the Chemical warfare hierarchy also appear in the hierarchy for Warfare. Some sets of terms are common to more than one hierarchy in both thesauri, especially terms from the hierarchies dealing with antipersonnel agents and chemical warfare agents.

Both thesauri utilize the same form of hierarchic structure in that in going from terms at the top step in a hierarchy to lower steps, one goes from the general to the particular. This generic structure is exhibited well in both thesauri in the hierarchies for Antipersonnel agents, where from Antipersonnel agents the first step takes the reader to Choking agents and Nerve agents, among others. One step below Nerve agents is G agents, which again steps down to particular G agents, such as GA and GB agents. Very little use is made of part-whole relations, one example appears in DRIT under Guided missiles in the step to Guided missile components.

In general the equivalent hierarchies from each thesaurus are similar to the extent that equivalent terms from the next step in the hierarchic structure of both thesauri. There are a few exceptions to this, mostly occurring where a term from one thesaurus does not have an equivalent in the other.

As is to be expected from the difference in the number of preferred terms in each thesaurus (17,810 in TEST and 10,198 in DRIT) there are more terms in TEST which do not have an equivalent term in DRIT than vice versa.

DRIT makes much use of precoordination for terms which are not preferred terms. The precoordination is printed as a lead in term, and the user is referred to the preferred terms which must be combined to represent the required term. For example for Guided bomb control systems DRIT requires the three terms Flight control systems, Guided bombs and Remote control to be used.

Many of DRIT's terms combinations are used for more than one entry. For example, the combination of Chemical warfare, and Military forces (foreign) is used for Foreign chemical warfare, Foreign chemical warfare activities and Foreign chemical warfare potential. There is an entry also for Foreign chemical warfare potentials, but here the combined terms are Chemical warfare and Foreign. What difference exists between these latter entries, is for the user to decide. These four terms and their associated USE references do not appear in TEST.

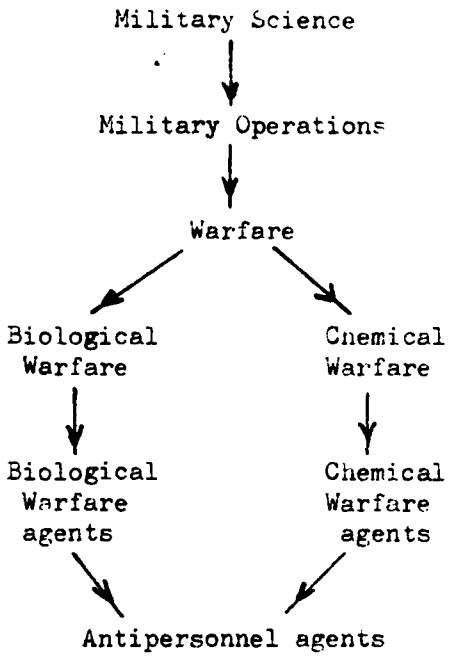
This use of precoordination in DRIT would undoubtedly lead to a great deal of noise occurring in any retrieval system based on DRIT, since many different concepts are represented by the same set of precoordinated terms.

Most of the preferred terms in DRIT have an equivalent preferred term in TEST, but there are some exceptions. For example Arsenic agents does not appear in TEST. Conversely, there are terms in TEST which do not appear as preferred terms in DRIT. The TEST term Military air facilities is not a preferred term in DRIT, the nearest entry is Military air bases and the user is instructed to use the term Military facilities instead, which is not such a specific term.

As there are terms in DRIT which do not have an equivalent in TEST, so there are similar terms in TEST. The four terms Amphibious demonstrations, Amphibious raids, Amphibious withdrawals and Diversionary landings are all narrower terms related to Amphibious operations in TEST. None of these terms has an equivalent in DRIT, the user has to rely on the term Amphibious operations to cover the requirements.

6.2 Comparison with the Model

It is interesting to compare the structure suggested in the model (Figure 1) to the actual structures used in each thesaurus. As an example consider the structure of that part of the model centred on chemical and biological warfare:



The equivalent section of TEST is confined to chemical warfare (Military chemical operations) as the terms for biological warfare and biological warfare agents (Biological operations and Biological agents) are not included in TEST's hierarchical structure but are isolates.

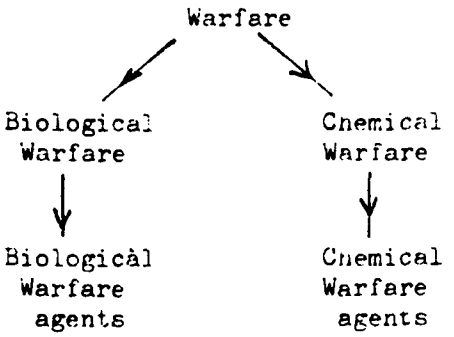
Military operations

Military chemical operations

The TEST terms for chemical warfare agents and antipersonnel agents do not appear in the same hierarchies as the chemical warfare term. They are in fact separate hierarchies, each with

more specific terms beneath them. Some of these more specific terms appear in both hierarchies.

The DRIT structure is nearer the model.



Only the term antipersonnel agents is missing. As with TEST, this term is the head of a separate hierarchy and some of its terms also appear under Chemical warfare agents in the main hierarchy.

This brief study has served to highlight difference in the structure of the two thesauri. While TEST has small hierarchic classes related to each other, DRIT combines the equivalent small classes into one large one.

6.3 Specificity of Terms

Hopker's method was used to compare the specificity of terms from the two thesauri (21). Graphs showing Rank number relations and class-size-rank relations are presented in Figures 2 and 3. Tables 2 and 3 show the rank number derivation for the 19 main hierarchies studied from each thesaurus. (See appendix 1.)

As has already been stated, some of the DRIT hierarchies tend to be much longer than their equivalents in TEST, and include topics which form the subject of separate hierarchies in TEST. For example many of the terms included in DRIT's hierarchy for Warfare come under Countermeasures in TEST. To ensure a fair comparison these additional subjects have been included in the calculations concerning TEST's hierarchies.

The main hierarchies affected by this are those covering the subjects of Military facilities, Military operations, Military organisations and Warfare.

The first column in Tables 2 and 3 shows the total number of terms in the hierarchy, taking account of any term which appears in more than one place in the same hierarchy. The second column gives the number of terms which have more specific terms below them (sub terms) in the hierarchy, irrespective of how many such sub terms there are. This differs from Hopker's original method where the class number was the number of terms with 10 or more sub terms in a classification scheme. Because the largest hierarchy studied had only 89 terms, and because generally the only term in the hierarchy with 10 or more sub terms is the main term, this method had to be altered. Hopker's study covered classification schemes in which class sizes numbered several hundreds of terms and so the number 10 was convenient.

The third column in Table 2 denotes the rank of each hierarchy. The rank was assigned to each hierarchy according to the number in column two, ie the hierarchy with the highest number of terms

with more specific terms was ranked number 1 and so on. It is interesting to note that only two equivalent hierarchies from each system had the same rank number, Warfare and Security while most of the others have a rank number within 2 or 3, the greatest difference between each thesaurus being five. The class for Pyrotechnics is ranked 14 in TEST and 9 in DRIT.

Where terms have the same number of subterms, the number of terms in the hierarchy determine the ranking.

Figure 2 shows the curves of rank plotted against the number of terms with more specific terms below them in the hierarchy for each class from the two thesauri. The curves follow each other closely, which suggests that there is very little difference in specificity between the two thesauri in the subject area studied.

Figure 3 gives curves of rank plotted against the number of terms in each class. Again the two curves follow each other closely, except where the TEST class ranked 10 stands out from the rest. This is the TEST class for Missiles and combines two small hierarchies while DRIT has the two sections in one hierarchy. The DRIT class for missiles is ranked 12, and this does rise up from the curve but it is not so prominent as TEST.

The TEST class for missiles contains 35 terms, 3 of which have a more specific term below them in the hierarchy, while the DRIT class has only 20 terms, with only 2 having more specific terms below them.

On studying the hierarchies again it is possible to determine that TEST is the more specific of the two thesauri. This is borne out by the fact that several of the more specific terms in TEST are missing from DRIT. The narrower terms to Amphibious operations have already been noted (see section 6.1). Other terms missing from DRIT are GE agent, GF agent, VG agent and VS agent. All these terms appear in TEST but have no equivalent in DRIT, nor is there a USE reference relevant to these terms.

6.4 Lead in Terminologies

As is shown in Table 1, DRIT has a grand total of 91,970 entries of which 10,198 are preferred terms, leaving 81,772 unwanted terms. In contrast, TEST has 23,364 entries of which 17,810 are preferred terms, with just 5,554 terms with USE references. Also TEST has a permuted index, the user can find a word required for a subject or one close to it, and be directed to a permitted term, or terms including this word. This is not an infallible method of locating the required term - especially where the required term is not included in the thesaurus, but it avoids having the main body of the thesaurus overburdened with unwanted terms.

Of the 5,554 undesirable terms listed in TEST, the common practise is to refer to just one preferred term such as Tear gases USE Incapacitating agents. Some precoordination is practised, usually combining two terms and sometimes three. Two examples of this are; Cross servicing (military) USE Logistics services and Interdepartmental procurement; Hard point defense, USE Terminal defense and Hardened installations.

Three term combinations are comparitively rare in TEST, but are common in DRIT. Four, five and even six term combinations are to be found in DRIT, although admittedly the latter two cases are rare. DRIT has an entry AP-aluminized binder - AP sandwiches USE Aluminum and Ammonium perchlorate and Binders and Laminates and Solid rocket fuels and Solid rocket oxidizers, a combination of six terms. This particular precoordination must be quite unusable in most indexing systems, unless a computerized retrieval system is used.

When USE references are included in a thesaurus it follows that a preferred term is called upon to act for more than one subject. TEST copes fairly well in this respect, since a term is used to represent up to only five or six subjects. In DRIT however, with it far higher incidence of USE references, a term can be called upon to represent as many as 400 concepts. The DRIT preferred term "Materials" is referred to by more than 430 entries. Admittedly, about 380 of these are in combination, but this leaves at least fifty topics represented by just the one word, including Material parameters, Material performance, Material problems, Material processes, Material properties, Material requirements, Materials applications, Materials components, Materials equipment, Materials processing and Materials science.

This must inevitably lead to a lack of specificity and the introduction of noise into a retrieval system using DRIT. The example quoted is extreme but not unique (Models is another preferred term referred to by at least 400 entries) but 10 USE references to a preferred term is common in DRIT.

7 Indexing

7.1 Introduction

An indexing comparison between the two thesauri was undertaken, using the titles and abstracts of 25 reports identified as being related to the COSATI 1500 and 1600 subject areas. At the same time the abstracts were indexed by the ASSASSIN program in order that index terms selected from the titles and abstracts of the reports could be compared with the terms from each thesaurus.

DRIC's indexing staff were asked to assign descriptors to each abstract, using each thesaurus. Each abstract was indexed twice from each thesaurus by two persons, and the two sets of descriptors were combined. Each indexer was asked to arrange the descriptors in order of relevance, so, because two indexers would probably have different ideas as to what the most important descriptors were, the final combination of descriptors can be regarded as having the most important descriptors listed first, with subsidiary terms in the second half of each list.

Also, indexers were asked to assign additional descriptors for concepts not covered by the thesaurus being used at the time, but which were considered to be relevant to the abstract. These additional terms are indicated by an asterisk in appendix 4, which shows the descriptors allocated to each reference from each system.

Appendix 4 also details the free text terms selected from the title and abstract of each reference by the ASSASSIN package.

No attempt has been made to arrange these terms in order of relevance, they are presented in alphabetical order just as ASSASSIN produced them.

The abstracts sheets given to DRIC's Technical Information Staff for the purposes of this exercise are included in appendix 3.

7.2 Users Reactions to the Thesauri

After using each thesaurus, each indexer was asked for their comments on each, using the simple questionnaire included in appendix 3.

When considering the replies from this questionnaire attention was paid to the fact that each indexer was used to TEST and that only a few of the abstracts were indexed by each person. However, first impressions of DRIT are useful, and taking the bias to TEST into account, some useful conclusions are drawn.

7.3 Indexing from TEST and DRIT

For the twenty five references studied, the lists of indexing terms assigned from each thesaurus are similar. Where additional terms were added to a list of index terms, these terms come into three categories. The biggest category is the one involving terms which were added to both lists for which no equivalent could be found in either thesaurus. These terms are:-

Mukluks	(Reference 1)
OSIS	(Reference 3)
Masterplan	(Reference 3)
Dexterity	(Reference 4)
Reefed mains extraction	(Reference 15)
Long term effects	(Reference 16)
World wide effects	(Reference 16)
Somatic effects	(Reference 16)
GACAM-1 (Model)	(Reference 22)
TAC-CONTENDER (Model)	(Reference 22)

The second largest category, almost as big as the first, is that in which TERMS added to the DRIT list had an equivalent term in TEST.

Boots	(Reference 2)
Evaluation	(Reference 2)
Design	(References 2, 17 and 23)
Trends	(Reference 4)
Antiradar missiles	(Reference 6)
Color matching	(Reference 10)
Combat uniforms	(Reference 10)
F-region	(Reference 14)

The smallest category is that consisting of terms added to the TEST list, for which an equivalent exists in DRIT.

Crises	(References 4 and 7)
China	(Reference 4)
Ground crews	(Reference 5)
Australia	(Reference 10)

It could be argued that the second category is in fact the same size as the first because the term Design appears in three references, giving a total number of additional indexing points of 10, the same as for the first category terms. However, counting the number of additional terms, and disregarding the number of times a term was used, gives 8 indexing points for the second category.

Considering the greater number of preferred term entries in TEST, it is not really surprising that more terms were added to the lists from DRIT (18) than to those from TEST (13).

Of the terms added to both lists, six terms can be considered as being very specific, Mukluks, OSIS, Reefed mains extraction, Somatic effects, GACAM-1 (Model) and TAC-CONTENDER (Model), and two as being very general, Long term effects and World wide effects. Because of this, it is difficult to justify the inclusion of any of them in any revision of either thesaurus. For example it can be argued that Mukluks can be adequately described by both thesauri by the term Footwear, and OSIS by the combination of the terms Ocean surveillance and Information systems. On the other hand, the terms Long term effects and World wide effects are too general to be admitted, even though both thesauri already contain terms of the same type.

Turning to the third category, ie terms which appear in DRIT but not in TEST, one, Crises, does not appear in either thesaurus, but DRIT does have the corresponding term Emergencies. These terms can be considered analagous and either would be a suitable term for inclusion in a revision of TEST, as would

the term Ground crews. The other two terms, China and Australia are not really necessary terms for a thesaurus. DRIT has several other terms for geographic location, including terms for all the states of the USA!

The third category, those terms in TEST which are not in DRIT, is composed of specific terms, with the exception of Evaluation and Design. This adds weight to the conclusion reached earlier (see section 6.2) that TEST is the more specific of the two thesauri.

One point of interest which arises here is TEST's term Boots (footwear). It is difficult to see the point of having the qualifier (footwear) in the term because the context of the report would distinguish Boots (footwear) from any other Boots, such as Boots (Chemist), which incidentally is the only possible alternative to Boots (footwear) which springs to mind.

7.4 ASSASSIN

The index terms assigned by the ASSASSIN package are also listed in appendix 4. Unlike the other two lists, these terms are given in alphabetical order, rather than in order of relevance.

The ASSASSIN program has produced complete factoring of all terms, except where these have been deliberately hyphenated in the computer input, eg Down-draught and Electronic-countermeasures.

The ASSASSIN terms do illustrate the value of a thesaural type indexing system, especially in the case of reference 24. Here, ASSASSIN has produced 17 terms including Air-launched, Airframes, Cruise, Expendable, Flight and Vehicles. The thesaural systems include the terms Airframes, Missile airframes, Cruise missiles, and Drone aircraft (TEST) and Airframes, Guided missiles, Cruise missiles, and Drones (DRIT). This is an illustration of the indexers use of knowledge that an expendable air launched cruise vehicle is either a drone aircraft, or (more likely) a cruise missile, and so the appropriate terms have been added. The ASSASSIN program makes provision for additional terms of this type, but a completely automated indexing system, as ASSASSIN was used here, misses these points.

7.5 Term Relations in each Thesaurus

In this section some terms from the ASSASSIN list have been selected and the term relations of their equivalents in TEST and DRIT have been studied. In particular the terms' positions in hierarchies and their relations to other terms in the respective hierarchies have been studied.

The terms chosen for this study are:

ASW (an abbreviation for antisubmarine warfare)

Air to Air engagements

Footwear

Mustard

Additionally the following terms, in coordination, were selected

Chemical Warfare

Ocean Surveillance

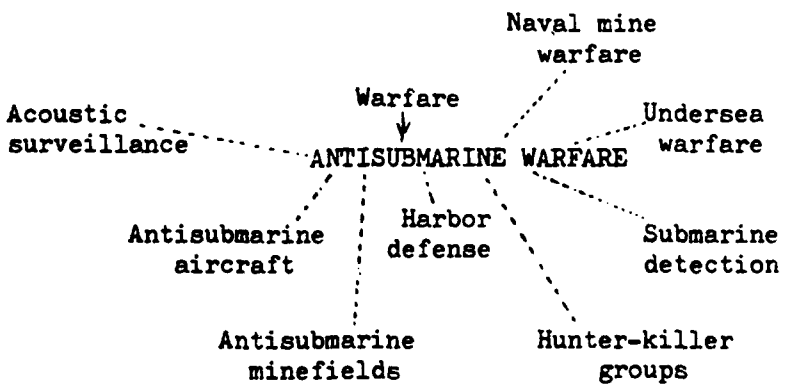
a) ASSASSIN term ASW

TEST term Antisubmarine warfare

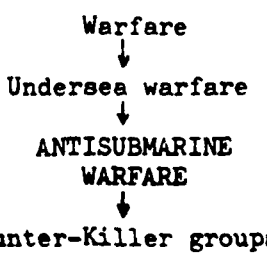
DRIT term Antisubmarine warfare

A solid line indicates hierarchic relation, with arrows showing the direction from general to specific, while dotted lines indicate cross references, or related terms.

TEST



DRIT

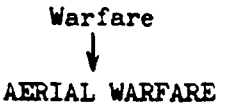


b) ASSASSIN term Air to Air engagements

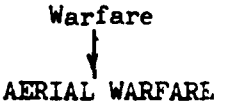
TEST term Aerial warfare

DRIT term Aerial warfare

TEST



DRIT

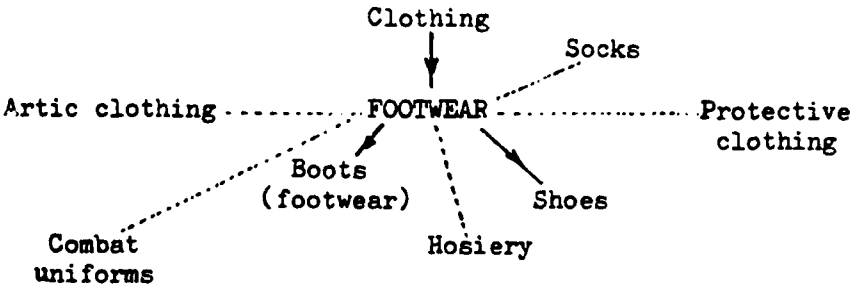


c) ASSASSIN term Footwear

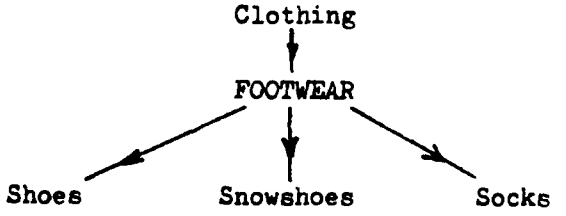
TEST term Footwear

DRIT term Footwear

TEST



DRIT

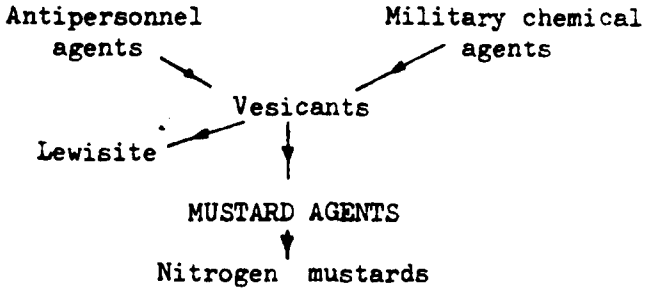


d) ASSASSIN term Mustard

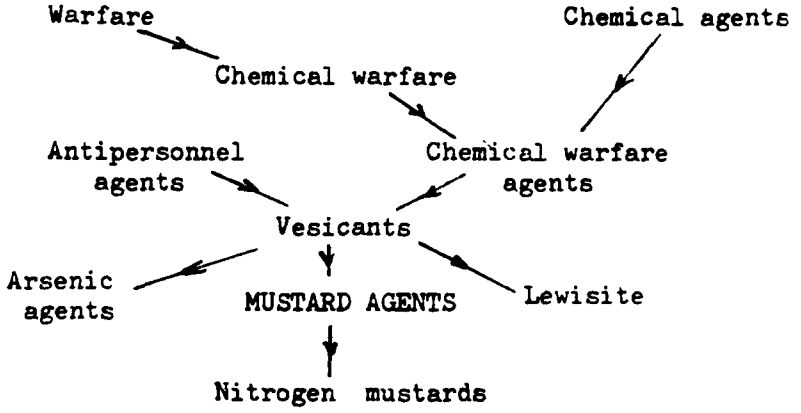
TEST term Mustard agents

DRIT term Mustard Agents

TEST



DRIT

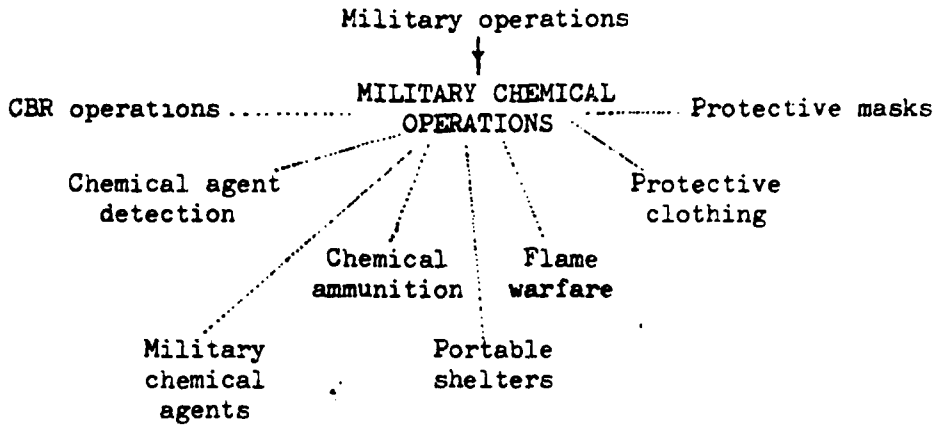


e) ASSASSIN term Chemical warfare

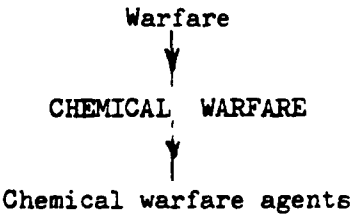
TEST term Military chemical operations

DRIT term Chemical warfare

TEST



DRIT

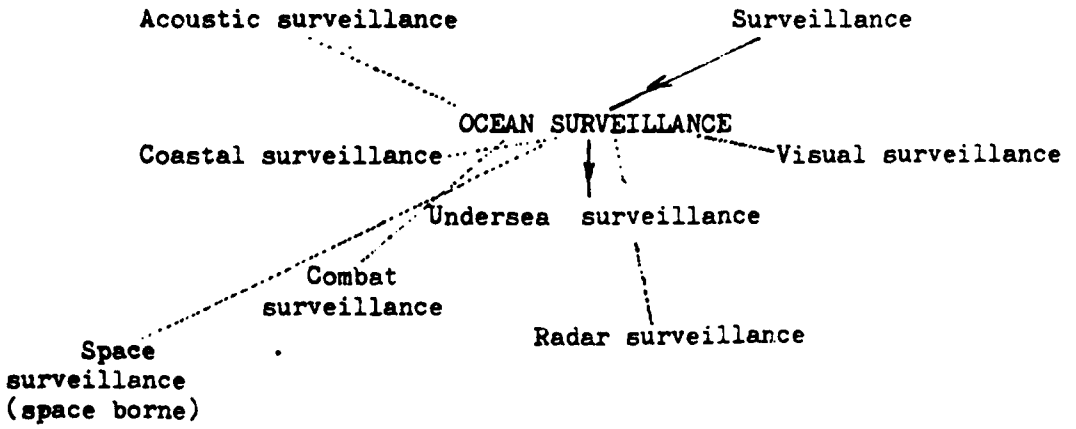


f) ASSASSIN term Ocean surveillance

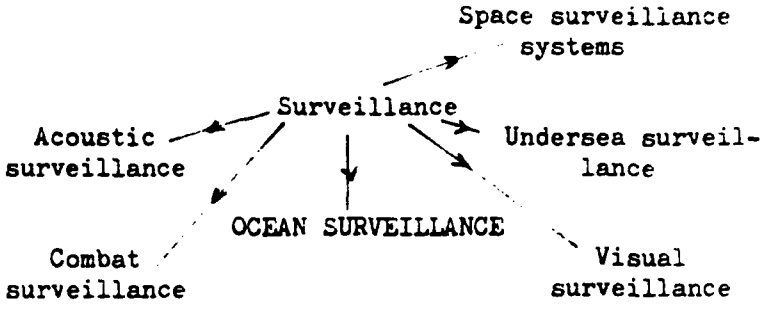
TEST term Ocean surveillance

DRIT term Ocean surveillance

TEST



DRIT



These few terms enable a closer examination of selected areas of hierarchies, as well as an examination of related terms in TEST.

The first term studied, Antisubmarine warfare, shows differences in hierarchical construction. In TEST the terms Undersea warfare and Hunter-killer groups are terms related to Antisubmarine warfare, whereas DRIT includes them both in the hierarchy, Undersea warfare as a broad term and Hunter-killer groups as a narrow term to Antisubmarine warfare.

In TEST, these terms appear in different places in the hierarchy Undersea warfare is a narrow term from Warfare, and only appears as a related term to Antisubmarine warfare. Hunter-killer groups is again a related term, but does not appear in a hierarchy. It is in fact an isolate.

The second term, Aerial warfare, is treated similarly in each thesaurus, and no further comment is necessary.

Footwear again shows some differences. The basic structures of the hierarchies are similar, but where TEST treats Socks as a related term, DRIT includes it in the hierarchy. This example

also includes a term in each hierarchy that does not appear in the other:

Boots (footware) (TEST) and Snowshoes (DRIT).

The next two terms, Mustard agents and Chemical warfare, are best considered together because DRIT actually combines two hierarchies in one.

The TEST and DRIT hierarchies concerning Mustard agents are essentially similar (except for the term Arsenic agents which appears in DRIT) up to the two broad terms Antipersonnel agents and Military chemical agents. In the case of DRIT the alternative term Chemical warfare agents is used for Military chemical agents, and it is here that the second difference is observed. Chemical warfare agents has two broader terms, Chemical agents and Chemical warfare, which in turn is a narrower term to Warfare.

Chemical warfare, or Military chemical operations as TEST prefers it, is in TEST a narrower term to Military operations rather than Warfare, and Military chemical agents is a related term rather than a narrower term.

As can be seen from the full DRIT hierarchy included in appendix 1, the hierarchy including Chemical warfare agents also includes terms related to Chemistry such as Chelating agents and Grignard reagents.

The last term, Ocean surveillance, is again treated similarly by each thesaurus.

8 User Reaction

8.1 Readability

Samples of the presentation of each thesaurus are included in Figures 4 and 5, see appendix 1. DRIT's computer origin is obvious in its presentation. The only concessions to readability are the bold print of the entry, the indenting of subsequent lines and the large print used. No differentiation is made between preferred terms and lead in terms, which makes searching for one term in 90,000 entries rather difficult. TEST has a similar layout to DRIT but there are not so many terms to search through wich simplifies matters.

TEST is printed in upper and lower case, and differentiates between preferred terms and lead in terms by printing the latter in italic. This does make TEST the easiest of the two thesauri to read. One indexer said that after using DRIT for more than fifteen minutes his eyes refused to focus on the all upper case print.

One minor difference between the two thesauri is connected with the larger print used in DRIT. Because of this, DRIT's presentation is a three column layout, as opposed to the four column layout used in TEST. The inference to be drawn here is that DRIT has been printed in a large typeface in an attempt to make it more readable. If the print size were reduced so that a four column layout could be used, and so reduce the number of pages necessary, the thesaurus would be even more unreadable than it already is.

8.2 User Preference

Nine people took part in the indexing exercise and were asked for their opinions of the two thesauri. Of the nine, five preferred TEST, two preferred DRIT, and two showed no preference. One of the latter thought the sample too small to come to any conclusions, but felt that both covered some topics well and were poor in other areas, and that these two areas did not always coincide. This same person went on to say that he preferred the more ordered arrangement of TEST, but thought that this might be due to familiarity.

The other indexer who showed no preference for either thesaurus also thought that familiarity with TEST would tend to weight any opinion of preference. He further thought that the two thesauri are totally different concepts, each having its own advantages and disadvantages.

Of the two indexers who preferred DRIT one liked the long list of USE terms which enabled a precise definition of descriptors. In a similar vein, the other indexer liked DRIT's use of precoordination, and the freedom from restriction by COSATI subject fields which are present in TEST. At the same time this indexer found DRIT's format too difficult to read, and locating descriptors was too much like hard work.

All five indexers who preferred TEST admitted that familiarity with TEST was probably a contributory factor to this preference. A greater factor was a dislike of DRIT. The most voiced dislike was the need to use too many descriptors to describe a

concept. Three or more terms to define a concept being very common. The terms in DRIT seem to cover parts of concepts rather than the whole, which again leads to a lot of precoordination.

One abstractor thought that DRIT's terms tended to be general rather than specific; another disliked the fact that DRIT has a word by word alphabetic arrangement, rather than the letter by letter arrangement of TEST. This means that words in DRIT appear in different order to that used in TEST.

Two indexers disliked the existence of such terms as Air to surface, and Air to Surface missiles as preferred terms, and the existence of such lead in terms as Surface-to-air missile and Surface to air missile, often appearing beside each other in the thesaurus.

The feature which was most liked about TEST was its structure which makes locating a term an easier task than it is with DRIT.

9 Discussion

To be accepted, a multidisciplinary thesaurus must compare favourably with TEST, which has become accepted as the leader in this field. DRIT in its present form, does not meet the requirements.

DRIT's two biggest drawbacks are the lower number of preferred terms (10,198 as opposed to TEST's 17,810) and the overwhelming number of terms with USE references, which have a suffocating effect on the thesaurus.

DRIT's preferred terms tend to be more general than the terms in TEST, and precoordination is used for many concepts. As a consequence of the general nature of the preferred terms the precoordination becomes unwieldy; many of these precoordinations combine three or more terms.

Many of the terms having a USE reference are unnecessary since they are slight variations in spelling, and are often adjacent to the term they are referred to. If these terms were edited out of the thesaurus it would not be so unwieldy and would become easier to use.

DRIT's presentation is also inferior to TEST's. It is all upper case, and makes no concession to the user in that there is no differentiation between a preferred term and a term with a USE reference.

Each thesaurus includes terms which have more than one broader term, but this practise is far more prevalent in DRIT. When generic posting is used to broaden a search this would, with DRIT, lead to the choice of broader terms envisaged by Farradane (20) and to a possible introduction of noise in retrieval.

TEST, having the fewer built-in precoordinations, would offer more scope for synthesis than DRIT. Because many concepts are already represented by precoordination in DRIT, precoordination for a new concept is very likely to introduce noise once again in DRIT. With TEST such noise is less likely to occur. Because of its 90,000 plus entries, DRIT is more likely to include a precoordination for a concept than TEST, and DRIT is often used in DRIC as a guide, to see how a concept not included in TEST could be precoordinated.

Should a second edition of DRIT be envisaged, the following points could be usefully incorporated:

1) Increase the number of preferred terms.

2) Rationalise the number of terms with USE references.

3) Use a mixture of upper and lower case print to make the thesaurus easier to read.

4) Some sort of typographic coding should be used to differentiate between a preferred term and one with a USE reference.

With so much in DRIT to find fault with, it is difficult to criticise TEST, which has become an unofficial yardstick against which other multidisciplinary thesauri are judged. Many specialised thesauri begain life by taking the relevant part of the TEST thesaurus and carrying on from there. This highlights the major fault with TEST (which is also a fault with DRIT) is that being a multidisaplinary thesaurus, many subjects are not adequately covered.

TEST preferred terms are subjected to a constraint in their use by the COSATI subject field which is allocated to each term. This is a difficulty when a useful term is found and the COSATI classification indicates that the term is relevant to a field other than the required one. However this difficulty is not insurmountable, the solution is to use the COSATI numbers as a guide, and to ignore them altogether when such an occasion arises as is described above.

The limited indexing exercise conducted for this investigation has shown that some compatibility between the two thesauri exists, but there are terms in each thesaurus which have no equivalent in the other, and terms which have no exact equivalent. Some examples of the latter are Military chemical operations, Military chemical agents and Missiles from TEST which become Chemical warfare, Chemical warfare agents and Guided missiles respectively in DRIT.

From the larger number of preferred terms available in TEST and the comparative absence of fixed precoordination it is possible to deduce that TEST is the more specific thesaurus, and that it has a more flexible indexing terminology than DRIT. Also, DRIT's use of precoordination means that the same terms are used to define several different subjects. This would introduce a great deal of noise at the retrieval stage. This also allows the deduction that DRIT would not have a better performance than TEST in retrieval of documents indexed by TEST.

The investigation has shown a method of assessing the value of a thesaurus, without the necessity of a reference standard. Ideally an indexing and retrieval exercise should be conducted. However, an indexing exercise alone will give some useful information. A much

larger number of documents should be used than was included in this work, where the number was limited by time. The documents chosen should cover all fields covered by the thesaurus, not just one section as was done here. An indexing exercise on this scale will not only highlight those areas which are not so well served by the thesaurus, and which terms are missing altogether, but will enable an objective evaluation to be made of the specificity of the terms included in the thesaurus.

It can be argued that in this study like has not been compared with like because two different concepts have been studied. TEST was derived as a thesaurus per se, while DRIT evolved from a machine aided indexing background. However, DRIT has been presented as a thesaurus, and so can be compared with others. Because of its background of machine aided indexing, DRIT would be a useful publication to complement any automated or semi-automated indexing system.

10 Conclusions

TEST is the better of the two thesauri for the following reasons:

1) It has more preferred terms.

2) It is better structured.

3) It is easier to read and use.

4) It distinguishes between preferred terms and terms with USE references by using a different type face.

5) TEST is more likely to gain user acceptance than DRIT.

TEST has a more specific indexing vocabulary than DRIT, but DRIT has many more lead in terms than DRIT and so can be said to give better guidance to the selection of preferred indexing terms. Paradoxically this is one of the faults with DRIT in its present form.

There are far too many unnecessary lead in terms in DRIT which are simply minor variations in spelling, such as singular instead of plural and hyphenated versions of the preferred term in the case of a compound word such as Surface to air missiles.

As was stated in chapter 1, there are no plans known concerning a revision of TEST, but as two versions of DRIT have already appeared, it is reasonable to conclude that DRIT will handle new concepts more adequately than TEST. This will only hold true if regular revisions of the thesaurus appear. The DRIC system of adding a term to the indexing language, as and when required, is the only alternative.

If TEST were replaced by DRIT, two major problems would arise. Firstly, for the reasons already stated, there would be a high level of noise included with material retrieved in any search strategy

based on DRIT. Secondly, a lot of relevant material would be missed because the indexing terms from the two thesauri cannot be considered compatible. This answers the second point raised in the terms of reference in the introduction: TEST will undoubtedly give the better retrieval results on DRIC's holdings.

There would be no advantage gained by replacing TEST with DRIT in its present form. This would actually introduce disadvantages. Should a new edition of DRIT be made available, taking into account t the points outlined in chapter 9, this situation may change.

Since it arose out of a machine aided indexing system, DRIT would be a useful tool in this area, but all the points discussed would still have to be borne in mind. Some editing would be useful.

As has been stated in chapter 9, DRIC staff often refer to DRIT for guidance to precoordination. This is another area where DRIT would be useful.

11 Recommendations for Further Work

In its present form, there is nothing to recommend any further study of the DDC Retrieval and Indexing Terminology. Should a second edition be published, this may warrant further study, but this would have to incorporate both editing of the massive lead in terminology to remove the unnecessary terms and extending the number of preferred terms. A case could be made for removing some of the present preferred terms which are themselves only part of another preferred term.

Any future work on a second edition of DRIT should first check for these points before any other work is done.

Evaluating any thesaurus can usefully be centred on an intensive indexing and retrieval exercise. This will highlight any deficiencies in the thesaurus and enable an objective measure of the specificity of terms to be made.

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Appendix 1

Figures and Tables

Page	Number of Preferred Terms	Total Number of Terms	Number of Terms with a USE reference
61	14	77	63
98	0	70	70
152	10	71	67
181	11	78	67
293	5	75	70
430	7	55	48
345	1	72	71
356	7	71	64
413	3	76	73
478	7	82	75
633	4	75	71
730	9	67	58
773	1	80	79
826	12	80	68
857	18	74	56
870	1	63	62
922	12	74	62
1116	4	70	66
1131	20	71	51
1220	16	80	64
Totals	162	1,461	1,299
Average number of terms per page	8.1	73.05	64.95
∴ Number of Terms in DRIT (1259 pages) (to nearest whole number)	10,198	91,970	81,772

Table 1

Calculation of the Number of Terms in DRIT

Main Subject of Class	Total Number of Terms	Number of Terms with Subterms	Rank
Warfare	89	21	1
Clothing	37	11	2
Military facilities	52	9	3
Antipersonnel agents	22	7	4
Chemical warfare agents	20	6	5
Camouflage	9	5	7
Logistics	18	4	8
Defence	14	4	9
Missiles	35	3	10
Intelligence	27	3	11
Military operations	16	3	12
Reconnaissance	14	3	13
Pyrotechnics	10	3	14
Bombing	16	2	15
Surveillance	13	2	16
Security	3	1	17
Strategy	2	1	18
Biological warfare	2	0	19

Table 2

Rank-Number Table for 19 Classes from TEST

Main Subject of Class	Total Number of Terms	Number of Terms with Subterms	Rank
Warfare	84	27	1
Military facilities	54	14	2
Chemical warfare agents	37	10	3
Clothing	30	8	4
Military organisations	27	7	5
Logistics	21	7	6
Antipersonnel agents	18	7	7
Camouflage	16	5	8
Pyrotechnics	19	4	9
Military operations	18	4	10
Reconnaissance	10	3	11
Missiles	20	2	12
Defence	17	2	13
Intelligence	12	2	14
Surveillance	8	2	15
Biological warfare	4	2	16
Security	4	2	17
Bombing	15	1	18
Strategy	2	1	19

Table 3

Rank-Number Table for 19 Classes from DRIT

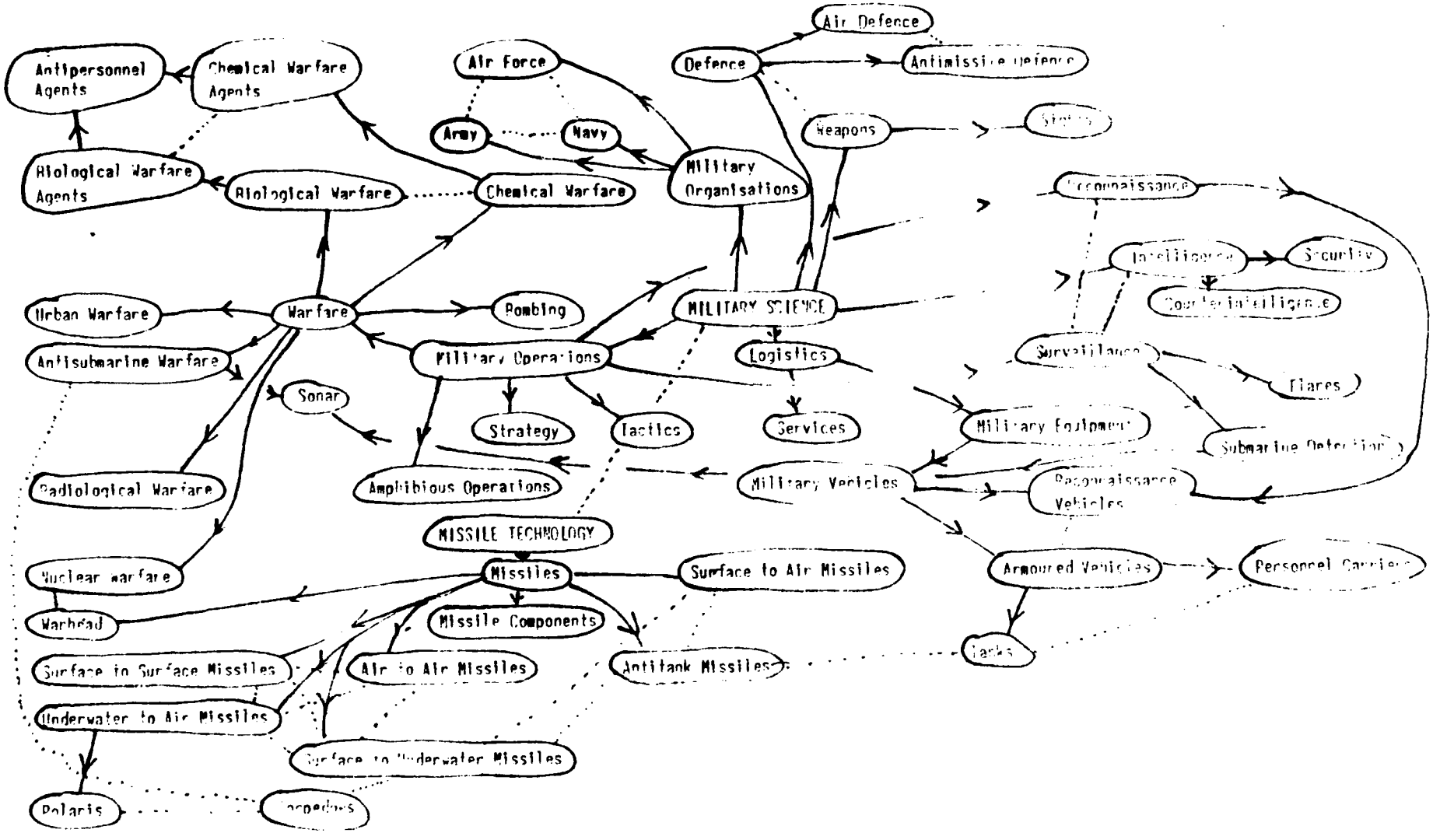

FIGURE 1 Model of Subject Area

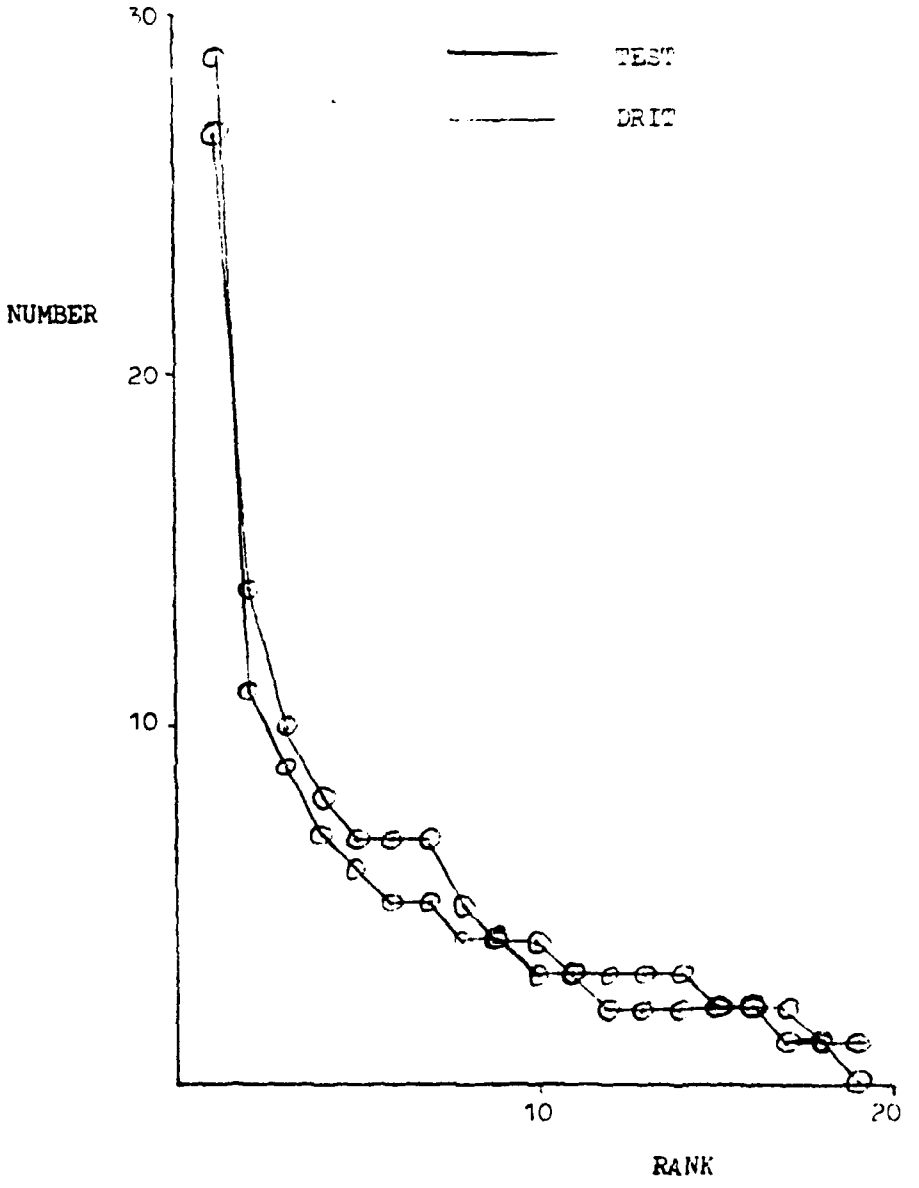

Figure 2

Rank - Number Relation

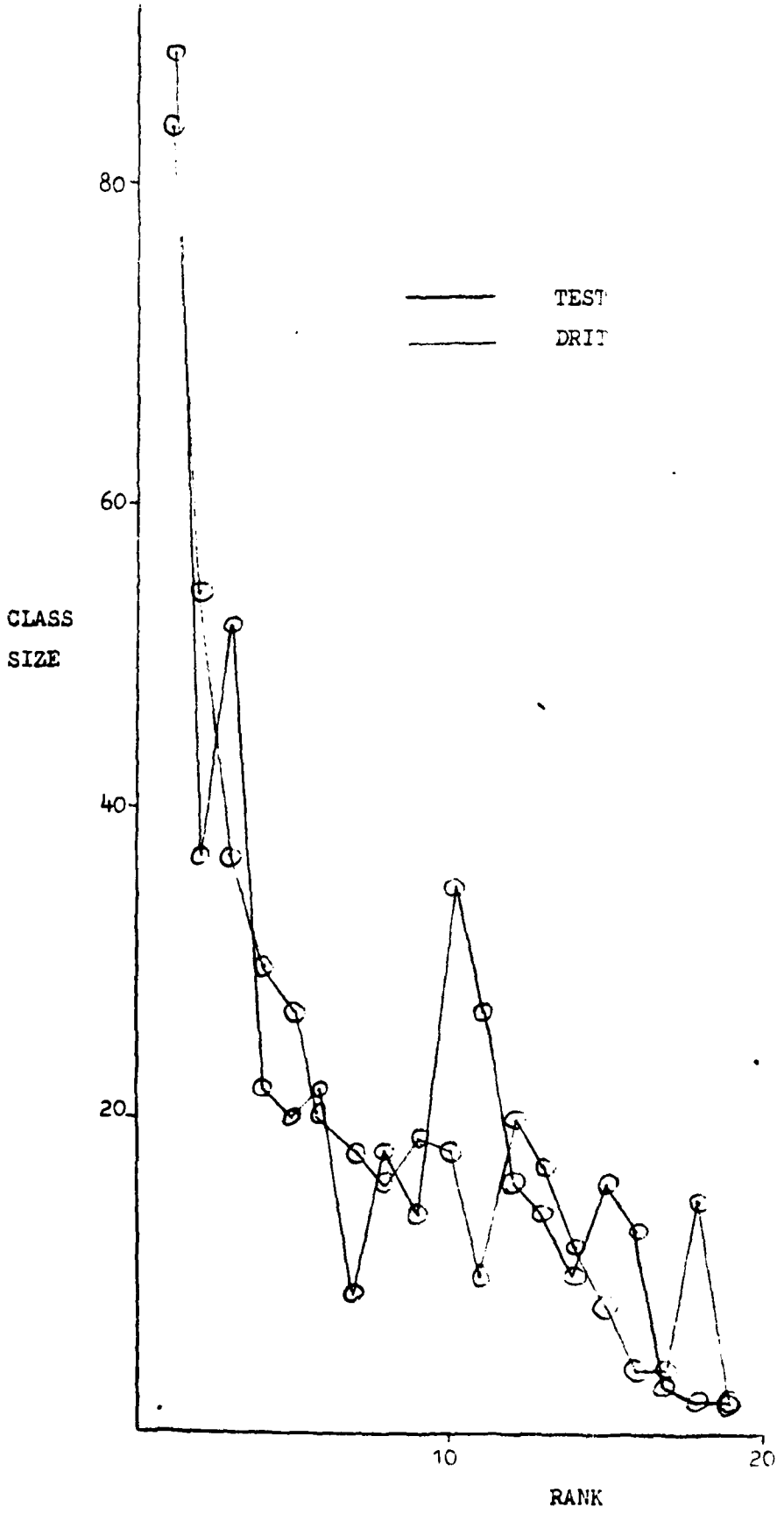

Figure 3

Class Size - Rank Relation

Microwave spectrometers 1402
UF Radiofrequency spectrometers
BT Microwave equipment
Spectrometers
RT Microwave spectroscopy
Microwave spectroscopy 1402
BT Radiofrequency spectroscopy
Spectroscopy
RT Infrared spectroscopy
Microwave spectrometers
—Molecular spectroscopy
Spectrum analysis
Microwave tubes 0901
BT Electron tubes
Microwave equipment
NT Backward wave tubes
Carcinotrons
—Klystrons
Magnetrons
Platinotrons
Reflex klystrons
—Traveling wave tubes
RT Antitransmit receive tubes
Microwave oscillators
Transmit receive tubes
—Triodes
—Vacuum tubes
Microyield strength 2012
UF Precision elastic limit
BT Elastic limit
Elastic properties
Mechanical properties
Midcourse defense 1503
BT Air defense
Antimissile defense
RT Early warning systems
Midcourse guidance 1707
RT —Command guidance
Injection guidance
Midcourse trajectories
Preset guidance
Rendezvous guidance
Spacecraft guidance
—Terminal guidance
Torpedo guidance
Midcourse trajectories 1904
BT Trajectories
RT Ascent trajectories
Descent trajectories
Midcourse guidance
Rendezvous trajectories
—Spacecraft trajectories
Middle ear 0616
UF Ear ossicles
BT Ear
RT Eustachian tube
Middle infrared radiation
USE Intermediate infrared radiation
Midges
USE Diptera
Midget submarines 1310
BT Ships
Submarines
Midlatitude sporadic E layer 0401
BT Earth atmosphere
E region
Ionosphere
Sporadic E layer
Upper atmosphere
Midocean ridges
USE Ocean ridges
Mie scattering 2006
BT Electromagnetic scattering
NT Rayleigh scattering
RT Meteorological radar
Migmatite 0907
BT Metamorphic rocks
Rocks
RT Gneiss
Schist
Migraine
USE Headache
Migrations 0510
NT Animal migrations
Population migrations
MIG welding
USE Gas metal arc welding
Mildew
USE Fungi
Mildew resistant coatings
USE Fungus resistant coatings
Military aircraft 0103
UF Military planes
BT Aircraft
NT Antisubmarine aircraft
Attack aircraft
Bomber aircraft
Carrier based aircraft
Electronic aircraft
Fighter aircraft
Patrol aircraft
Perceptors
Reconnaissance aircraft
Submarine aircraft
Surveillance drones
Tactical aircraft
Tanker aircraft
Target drone aircraft
Troop carrier helicopters
RT Airships
—Cargo transportation
Commercial aircraft
Drone aircraft
Flying platforms
[illegible] aircraft
[illegible]
[illegible]
Hypersonic aircraft
[illegible] aircraft
Military spacecraft
Observation aircraft
Organizational equipment (military)
Research aircraft
Rocket planes
—Rotary wing aircraft
Short takeoff aircraft
—Supersonic aircraft
Training aircraft
—Transport aircraft
Utility aircraft
—Vertical takeoff aircraft
Military air facilities 0105
UF Air bases
Air force bases
Army air bases
Coast guard air stations
Marine Corps air stations
Naval air stations
BT Military facilities
RT Aircraft carriers
Airports
Airport towers
—Air traffic control
Hangars
Heliports
—Landing aids
—Navigational aids
Taxiways
Military alert 1503 1507
RT Military mobilizing
Military assistance 0504
Includes advisory personnel, troops, materiel and training
BT Foreign aid
RT Counterinsurgency
Developing countries
Military bases 1505
UF Overseas military bases
BT Military facilities
NT Missile bases
RT Advanced bases
Real property
Military blockades 1507
RT Economic warfare
Military bridges
USE Bridges (structures)
Military chemical agents 1502
Chemicals that produce lethal or damaging effects on men, animals, plants, or materiel, or that produce a screening or signaling smoke
UF Chemical warfare agents
NT BZ agents
Choking agents
GA agent
—G agents
GB agent
GD agent
GE agent
GF agent
Lewisite
—Mustard agents
—Nerve agents
Nitrogen mustards
Psychochemical agents
—V agents
VE agent
—Vesicants
VG agent
VS agent
VX agent
RT Anticrop agents
Antiinvasion agents
Antimateriel agents

Figure 4

TEST Presentation

MILITARY AIR WEAPON SYSTEMS
USE AIRBORNE
and WEAPON SYSTEMS

MILITARY AIRBORNE WEAPON SYSTEMS
USE AIRBORNE
and WEAPON SYSTEMS

MILITARY AIRCRAFT
NT ARMY AIRCRAFT
•BOMBER AIRCRAFT
ELECTRONIC AIRCRAFT
•NAVAL AIRCRAFT
•RECONNAISSANCE AIRCRAFT
•TACTICAL AIRCRAFT
BT AIRCRAFT

MILITARY AIRCRAFT APPLICATIONS
USE MILITARY AIRCRAFT
and MILITARY APPLICATIONS

MILITARY AIRCRAFT AVIONICS
USE AVIONICS
and MILITARY AIRCRAFT

MILITARY AIRCRAFT BRAKE ANTISKID SYSTEM
USE BRAKES
and MILITARY AIRCRAFT
and SKIDDING

MILITARY AIRCRAFT BRAKE ANTISKID SYSTEMS
USE BRAKES
and MILITARY AIRCRAFT
and SKIDDING

MILITARY AIRCRAFT COCKPIT DISPLAYS
USE COCKPITS
and DISPLAY SYSTEMS
and MILITARY AIRCRAFT

MILITARY AIRCRAFT CONFIGURATION RESEARCH
USE MILITARY AIRCRAFT

MILITARY AIRCRAFT ENVIRONMENTS
USE ENVIRONMENTS
and MILITARY AIRCRAFT

MILITARY AIRCRAFT EQUIPMENT
USE AIRCRAFT EQUIPMENT
and MILITARY AIRCRAFT

MILITARY AIRCRAFT FLIGHT CONTROL SYSTEMS
USE FLIGHT CONTROL SYSTEMS
and MILITARY AIRCRAFT

MILITARY AIRCRAFT FLOTATION
USE FLOTATION
and MILITARY AIRCRAFT

MILITARY AIRCRAFT LOAD ENVIRONMENT
USE ENVIRONMENTS
and LOADING(HANDLING)
and MILITARY AIRCRAFT

MILITARY AIRCRAFT MAINTENANCE
USE MAINTENANCE
and MILITARY AIRCRAFT

MILITARY AIRCRAFT OPERATIONS
USE MILITARY AIRCRAFT
and OPERATION

MILITARY AIRCRAFT OXYGEN SYSTEMS
USE MILITARY AIRCRAFT
and OXYGEN EQUIPMENT

MILITARY AIRCRAFT PROGRAMS
USE MILITARY AIRCRAFT

MILITARY AIRCRAFT STRUCTURAL JOINTS
USE AIRFRAMES
and JOINTS
and MILITARY AIRCRAFT

MILITARY AIRCRAFT STRUCTURES
USE AIRFRAMES
and MILITARY AIRCRAFT

MILITARY AIRCRAFT SYSTEMS
USE MILITARY AIRCRAFT

MILITARY AIRCRAFT TIRES
USE MILITARY AIRCRAFT
and TIRES

MILITARY AIRCRAFT VULNERABILITY
USE MILITARY AIRCRAFT
and VULNERABILITY

MILITARY AIRCRAFT WHEEL
USE MILITARY AIRCRAFT
and WHEELS

MILITARY AIRCRAFT WHEEL MAINTENANCE
USE MAINTENANCE
and MILITARY AIRCRAFT
and WHEELS

MILITARY AIRCREW
USE FLIGHT CREWS
and MILITARY PERSONNEL

MILITARY AIRFIELD PAVEMENT SYSTEMS
USE LANDING FIELDS
and MILITARY FACILITIES
and PAVEMENTS

MILITARY AIRFIELD PAVEMENTS
USE LANDING FIELDS
and MILITARY FACILITIES
and PAVEMENTS

MILITARY AIRFRAME EFFICIENCY
USE AIRFRAMES
and EFFICIENCY
and MILITARY AIRCRAFT

MILITARY AIRFRAMES CONSTRUCTION
USE AIRFRAMES
and CONSTRUCTION
and MILITARY AIRCRAFT

MILITARY AIRPLANES
USE MILITARY AIRCRAFT

MILITARY APPLICATIONS

MILITARY AREAS
USE MILITARY FACILITIES

MILITARY ASPHALT
USE ASPHALT
and MILITARY APPLICATIONS

MILITARY ASSISTANCE

MILITARY ATTACK AIRCRAFT
USE ATTACK AIRCRAFT

MILITARY ATTITUDES
USE ATTITUDES(PSYCHOLOGY)
and MILITARY PERSONNEL

MILITARY AVIATION
USE AERONAUTICS
and MILITARY APPLICATIONS

MILITARY AVIATION SYSTEMS
USE MILITARY AIRCRAFT

MILITARY AVIATORS
USE MILITARY PERSONNEL
and PILOTS

MILITARY AVIONICS
USE AVIONICS
and MILITARY APPLICATIONS

MILITARY BARRIERS
USE BARRIERS
and MILITARY APPLICATIONS

MILITARY BASES
USE MILITARY FACILITIES

MILITARY BATTERIES
USE MILITARY APPLICATIONS
and STORAGE BATTERIES

Figure 5

DRIT Presentation

Appendix 2

Hierarchies from TEST and DRIT

Subjects

Antipersonnel agents

Biological warfare

Bombing

Camouflage

Chemical warfare agents

Clothing

Defence

Intelligence

Logistics

Military facilities

Military operations

Military organisations

Missiles

Pyrotechnics (Flares)

Reconnaissance

Security

Strategy

Surveillance

Warfare

TEST

	Other Broad Terms
Antipersonnel agents	Military chemical agents
Choking agents	Military chemical agents
Incapacitating agents	
BZ agents	Military chemical agents
CS agents	
Psychochemical agents	Military chemical agents
Nerve agents	
G agents	
GA agent	
GB agent	
GD agent	
GE agent	
GF agent	
V agents	
VE agent	
VG agent	
VS agent	
VX agent	
Vesicants	Military chemical agents
Lewisite	
Mustard agents	
Nitrogen mustards	

	Other Broad Terms
Antipersonnel agents	
Choking agents	Non lethal agents
Incapacitating agents	Non lethal agnets
BZ agents	
CS agents	Irritating agents
Nerve agents	Chemical warfare agents
G agents	
GA agent	
GB agent	
GD agent	
V agents	
VE agent	
VX agent	
Vesicants	Chemical warfare agents
Arsenic agents	
Lewisite	
Mustard agents	
Nitrogen mustards	

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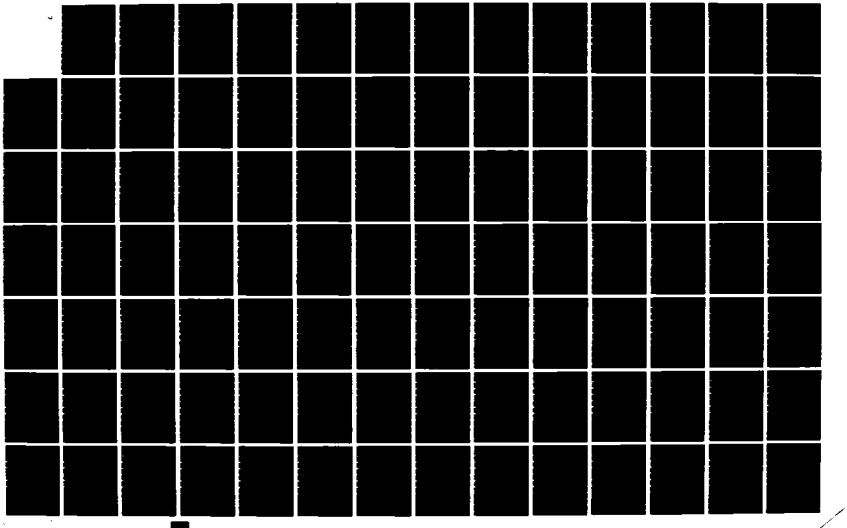

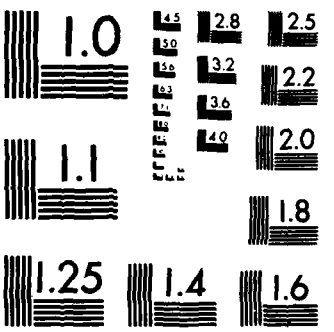

TEST

Biological operations	ISOLATE
Biological agents	ISOLATE

DRIT

	Other Broad Terms
Biological agents	
Biological warfare agents	Biological warfare
B agents	Chemical warfare agents
C agents	Chemical warfare agents

TEST

Bombing

- Area bombing
- High altitude bombing
- High speed bombing
- Infrared bombing
- Low altitude bombing
- Medium altitude bombing
- Night bombing
- Pattern bombing
- Precision bombing
- Radar bombing
- Shipbombing
- Strategic bombing
- Tactical bombing
  - Dive bombing
- Toss bombing

	Other Broad Terms
Bombing	
Area bombing	
Blind bombing	
Dive bombing	
High altitude bombing	
High speed bombing	
Low altitude bombing	
Night bombing	
Offset bombing	
Precision bombing	
Radar bombing	Radar
Ship bombing	
Strategic bombing	
Tactical bombing	
Toss bombing	

TEST

	Other Broad Terms
Camouflage	
Radar camouflage	Radar deception
Antiradar coatings	
Deception	
Radar deception	
Radar camouflage	Camouflage
Antiradar coatings	
Radio deception	

DRIT

Deception	
Camouflage	
Antisonar coating	Antireflection coatings
Radar camouflage	Radar deception
Decoys	
Acoustic decoys	Acoustic countermeasures
Infrared decoys	Infrared countermeasures, Infrared equipment
Radar decoys	Radar deception
Radar deception	Electronic countermeasures
Chaff	Radar reflectors
Radar camouflage	Camouflage
Antiradar coatings	Antireflection coatings
Radar confusion reflectors	Radar reflectors
Radar decoys	Decoys
Radar repeaters	Radar equipment, Repeaters
Radio deception	Electronic countermeasures

TEST

	Other Broad Terms
Military chemical agents	
BZ agents	Incapacitating agents
Choking agents	Antipersonnel agents
Nerve agents	Antipersonnel agents
G agents	
GA agent	
GB agent	
GD agent	
GE agent	
GF agent	
V agents	
VE agent	
VG agent	
VS agent	
VX agent	
Psychochemical agents	Antipersonnel agents
Vesicants	Antipersonnel agents
Lewisite	
Mustard agents	
Nitrogen mustards	

	Other Broader Terms
Chemical agents	
Binary chemical agents	
Chelating agents	
Chemical warfare agents	Chemical warfare
B agents	Biological warfare agents
Blood agents	
C agents	Biological warfare agents
Nerve agents	Antipersonnel agents
G agents	
GA agent	
GB agent	
GD agent	
V agent	
VE agent	
VX agent	
Non lethal agents	
Choking agents	Antipersonnel agents
Incapacitating agents	Antipersonnel agents
BZ agents	
CS agents	
Irritating agents	
CS agents	
Tear gas	
Vomiting agents	
Poisonous gases	Gases
Psychochemical agents	
Vesicants	Antipersonnel agents
Arsenic agents	
Lewisite	

(Continued)

Chemical agents (continued)

Mustard agents

Nitrogen mustards

Cryoprotective agents

Defoliants

Frothing reagents

Grignard reagents

Lethal agents — Lethality

Riot control agents — Riot control

Toxic agents

TEST

Clothing

- Camouflage clothing
- Environmental clothing
  - Arctic clothing
  - Exposure suits
  - Overcoats
  - Pressure suits
  - Survival clothing
    - Life jackets
- Flight clothing
- Footwear
  - Boots (footwear)
  - Shoes
- Gloves
  - Rubber gloves
  - Surgical gloves
- Goggles
  - Snow goggles
- Headgear
  - Hats
  - Helmets
- Hosiery
  - Socks
- Protective clothing
  - Body armor
  - Exposure suits
  - Flak suits
  - Gasproof clothing

(continued)

Clothing (continued)

Helmets

Overcoats

Pressure suits

Underwater clothing

Diving suits

Tropical clothing

Underwear

Uniforms

Combat uniforms

Dress uniforms

	Other Broad Terms
Clothing	
Coveralls	
Flight clothing	
Flak suits	Protective clothing
Footwear	
Shoes	
Snowshoes	
Socks	
Gloves	
Rubber gloves	
Goggles	
Headgear	
Helmets	Protective clothing
Flight helmets	
Jackets	
Overcoats	
Parkas	Protective clothing
Protective clothing	
Body armor	Armor
Exposure suits	
Fire protective clothing	Fire resistance
Flak suits	Flight clothing
Gasproof clothing	
Helmets	Headgear
Flight helmets	
Parkas	Clothing

(continued)

Clothing (continued)

- Pressure suits
- Protective masks — Breathing masks, Masks
  - Protective mask canisters
  - Protective mask facepieces
  - Protective mask filters — Gas filters
- Underwater clothing

Underwear

Air defense

Antiaircraft defense

Antimissile defense

Launch defense

Midcourse defense

Terminal defense

Area defense

Point defense

Urban defense

Defense systems	ISOLATE	More specific term recommended
Harbor defense	ISOLATE	
Passive defense		
Civil defense		
Spacecraft defense	ISOLATE	

Defense systems

- Air defense
  - Antiaircraft defense systems
  - Antimissile defense systems
  - Terminal defense
- Aircraft defense systems
- Antisattelite defense systems
- Antisubmarine defense system
- Area defense
- Civil defense
- Guided missile defense systems
- Harbor defense systems
- Passive defense
- Point defense
- Ship defense systems
- Spacecraft defense systems

Intelligence

- Acoustic intelligence
- Biographical intelligence
- Biological intelligence
- Communications intelligence
- Counterintelligence
- Economic intelligence
  - Commercial intelligence
  - Industrial intelligence
- Electronic intelligence
- Medical intelligence
- Military intelligence
  - Air intelligence
  - Army intelligence
  - Naval intelligence
  - Tactical intelligence
  - Target intelligence
- Oceanographic intelligence
- Operational intelligence
- Photographic intelligence
- Political intelligence
- Sociological intelligence
- Strategic intelligence
- Technological intelligence
- Terrain intelligence
- Weather intelligence

Intelligence

- Acoustic intelligence
- Counterintelligence
- Electronic intelligence
- Military intelligence
  - Air intelligence
  - Communications intelligence
  - Naval intelligence
  - Strategic intelligence
  - Tactical intelligence
- Photographic intelligence
- Terrain intelligence

TEST

	Use from Terms
Services	
Consulting services	
Contracted services	Food services
Field cooking	
Food dispensing	
Food preparation	
Food services	
Food dispensing	
Field cooking	
Food preparation	
Quick service meals	
Food services management	
Graves registration services	Quartermaster services
Hospitalising	Medical services
Logistics services	
Medical services	
Hospitalising	
Military exchange services	
Quartermaster services	
Graves registration services	
Quick service meals	Food services
Water services	

	Other broad Terms
Logistics	
Air force equipment	Military equipment
Army equipment	Military equipment
Military procurement	Government procurement
Air force procurement	
Army procurement	
Naval procurement	
Military supplies	Materiel, Supplies
Stores	
Naval logistics	
Naval equipment	Military equipment
Spare parts	Parts
Strategic materials	
Supplies	
Medical supplies	
Catheters	
Dressings	
Surgical supplies	
Ligatures	
Sutures	
Military supplies	Materiel, Logistics
Stores	
Supply depots	Depots

Military facilities

- Barracks
- Commissaries
- Fortifications
- Hardened installations
- Military air facilities
- Military bases
  - Missile bases
- Military depots
- Missile launching sites

Aircraft landing areas

- Flight decks
- Landing pads
- Runways

TEST

Other broad terms

Ranges (facilities)

Bombing ranges — Test facilities

Missile ranges — Test facilities

Test ranges

Acoustic ranges

Aeroballistic ranges

Ballistic ranges

	Other broad Terms
Test facilities	
Bombing ranges	Ranges (facilities)
Missile ranges	Ranges (facilities)
Proving grounds	
Rocket tracks	
Shock tubes	Tubes
Test chambers	
Altitude chambers	
Anechoic chambers	
Humidity rooms	
Vacuum chambers	
Test stands	
Wind tunnels	
Hypervelocity wind tunnels	
Subsonic wind tunnels	
Supersonic wind tunnels	
Transonic wind tunnels	

Laboratories

Aeronautical laboratories

Biological laboratories

Chemical laboratories

Electronics laboratories

Hydraulic laboratories

Mathematics laboratories

Medical laboratories

Metallurgical laboratories

Nuclear physics laboratories

Ordnance laboratories

Physics laboratories

Radiochemistry laboratories

Radiological laboratories

	Other Broad Terms
Facilities	
Depots	
Supply depots	Logistics
Military facilities	
Air force facilities	
Bare bases	
Barracks	
Floating bases	
Fortifications	
Naval shore facilities	
Naval air stations	Stations
Naval research laboratories	Laboratories
Submarine bases	
Research facilities	
Laboratories	
Aeronautical laboratories	
Biological laboratories	
Chemical warfare laboratories	
Electronics laboratories	
Flying laboratories	
Materials laboratories	
Mathematics laboratories	
Medical laboratories	
Clinical laboratories	
Metallurgical laboratories	
Naval research laboratories	Naval shore facilities
Ordnance laboratories	
Physics laboratories	

(continued)

Facilities (continued)

Nuclear physics laboratories

Radiochemistry laboretories

Radiological laboratories

Rocket laboratories

Terminal flight facilities

Airport control towers

Airports

Landing fields

Runways

Taxiways

Landing mats — Mats

Test facilities

Altitude chambers

Light gas guns — Gas guns

Model basins

Ranges (facilities)

Acoustic ranges

Guided missile ranges

Range safety — Safety

Tracks (aerodynamics) — Tracks

Vacuum chambers — Chambers, Vacuum apparatus

Wind tunnels

Hypersonic wind tunnels

Subsonic wind tunnels

Supersonic wind tunnels

Transonic wind tunnels

Underground facilities

TEST

Other Broad Terms

Military operations

- Air force operations
- Airmobile operations — Airborne operations
- Area denial
- Army operations
- CBR operations
- Combined operations
- Joint operations
- Logistics operations
- Military chemical operations
- Naval operations

Amphibious operations

- Amphibious demonstrations
  - Diversionary landings
- Amphibious raids
- Amphibious withdrawals

	Other Broad Terms
Military operations	
Air drop operations	Aerial delivery
Air force operations	
Airmobile operations	
Amphibious operations	
beachheads	
Area denial	
Army operations	
Interdiction	
Manoeuvers	
Fleet manoeuvers	
Flight manoeuvers	
Hovering	
Sideslip	
Turning flight	
Military exercises	
Military formations	
Naval operations	

Organisations

Corporations

Expeditions

Labor unions

Societies

Technical societies

Engineering societies

Scientific societies

Task forces

Trade associations

Military organisations

- Air force
- Armed forces (foreign)
- Armed forces (United States)
  - Marine corps
- Armed forces reserves
- Army
- Coast guard
- International military forces
- Multilateral forces
- NATO forces
- Navy

	Other broad terms
Organisations	
Labor unions	Industrial relations
Military organisations	
*Calvary	
Military forces (foreign)	Foreign
Military forces (United States)	
Air force	
Air defence command	
Air force logistics command	
Air force systems command	
Strategic air command	
Tactical air command	
Army	
Field army	
Coast guard	
Marine corps	
Navy	
Military reserves	
National guard	
NATO	
Regiment level organisations	
Battalion level organisations	
Company level organisations	
Seabees	Naval personnel
Scientific organisations	
Task forces	

*This is surely a misprint for Cavalry

TEST

	Other Broad Terms
Missile components	
Missile antennas	Antennas
Missile batteries	
Missile destructors	
Missile fuzes	Fuzes (ordnance)
Missile warheads	Warheads
Missiles	
Air to air missiles	
Air to space missiles	
Air to surface missiles	
Air to underwater missiles	
Antiaircraft missiles	
Antimissile missiles	
Antiradar missiles	
Antisattelite missiles	
Antiship missiles	
Antisubmarine missiles	
Antitank missiles	Antitank weapons
Ballistic missiles	
Fleet ballistic missiles	
Intercontinental ballistic missiles	
Intermediate range ballistic missiles	
Medium range ballistic missiles	
Short range ballistic missiles	
Cruise missiles	
Mobile missiles	

(continued)

Missiles (continued)

Space to air missiles

Space to surface missiles

Surface to air missiles

Surface to space missiles

Surface to surface missiles

Surface to underwater missiles

Underwater to air missiles

Underwater to surface missiles

Underwater to underwater missiles

	Other Broad Terms
Guided missiles	
Air to air missiles	
Air to surface missiles	
Air to underwater missiles	
Antiaircraft missiles	Antiaircraft missiles
Antiradiation missiles	
Cruise missiles	
Fleet ballistic missiles	
Guided missile components	
Guided missile antennas	Antennas
Guided missile batteries	Electric batteries
Guided missile computers	Computers
Guided missile fuzes	Fuzes (ordnance)
Guided missile warheads	Warheads
Guided missile windows	
Nose cones	Noses
Reconnaissance missiles	
Surface to air missiles	
Surface to surface missiles	
Underwater to surface missiles	

Pyrotechnics

- Flares
  - Aircraft flares
  - Colored flares
  - Parachute flares
  - Rocket flares
- Illuminating ammunition
- Photoflash ammunition
- Smoke ammunition
- Spotting charges

	Other Broad Terms
Pyrotechnics	
Flares	
Aircraft flares	
Colored flares	
Float flares	
Infrared flares	Infrared equipment
Parachute flares	
Rocket flares	
Illuminating grenades	Grenades
Illuminating projectiles	Projectiles
Photoflash ammunition	Ammunition, Photographic lighting systems
Photoflash bombs	Bombs
Photoflash cartridges	Cartridges
Photoflash projectiles	Projectiles
Smoke munitions	Ammunition
Smoke bombs	Bombs
Smoke projectiles	Projectiles
Spotting charges	Explosive charges
White phosphorus	Phosphorus

Reconnaissance

- Acoustic reconnissance
- Aerial reconnaissance
- Electronic reconnaissance
  - Radar reconnaissance
  - Television reconnaissance
- Ground reconnaissance
- Infrared reconnaissance
- Naval reconnaissance
  - Submarine reconnaissance
- Photographic reconnaissance
- Space reconnaissance
- Ultraviolet reconnaissance
- Visual reconnaissance

	Other Broad Terms
Reconnaissance	
Aerial reconnaissance	
Electronic reconnaissance	
Radar reconnaissance	
Infrared reconnaissance	
Night reconnaissance	
Overflight	Flight
Photographic reconnaissance	
Multiband spectral reconnaissance	
Tactical reconnaissance	Military tactics

TEST

	Other Broad Terms
Security	
Electronic security	
Internal security	

DRIT

Security	
Electronic security	
Data processing security	
Security personnel	Personnel

TEST

Strategy

Military strategy

DRIT

Strategy

Military strategy

TEST

Surveillance

- Acoustic surveillance
- Air surveillance
- Coastal surveillance
- Combat surveillance
- Infrared surveillance
- Ocean surveillance
  - Undersea surveillance
- Radar surveillance
- Space surveillance (ground based)
- Ultraviolet surveillance
- Visual surveillance

Surveillance

- Acoustic surveillance
- Combat surveillance
- Infrared surveillance
- Ocean surveillance
  - Undersea surveillance
- Space surveillance systems
- Visual surveillance

Warfare

- Aerial mine warfare
- Aerial warfare
- Antisubmarine warfare
- Cold war
- Economic warfare
- Electronic warfare
- Flame warfare
- General war
- Jungle warfare
- Landmine warfare
- Limited war
- Naval mine warfare
- Night warfare
- Nuclear warfare
- Political warfare
- Psychological warfare
- Space warfare
- Special warfare
  - Counterguerilla warfare
  - Counterinsurgency
  - Unconventional warfare
    - Evasion
    - Guerilla warfare
    - Subversion
      - Resistance movement (political)
- Tactical warfare
- Undersea warfare
- Urban warfare

TEST

	Other Broad Terms
Countermeasures	
Acoustic decoys	Decoys
Countercountermeasures	
Antijamming	Electronic countermeasures
Burnthrough (countermeasures)	
Radar antijamming	
Constant false alarm receivers	
Radio antijamming	
Electronic countermeasures	
Antijamming	Countercountermeasures
Burnthrough (countermeasures)	
Radar antijamming	
Constant false alarm receivers	
Radio antijamming	
Electronic jammers	
Electronic noise jammers	
Barrage jammers	
Spot jammers	
Sweepthrough jammers	
False target generators	
Multiple target generators	
Radar track breakers	
Repeater jammers	
Radar confusion reflectors	
Chaff	
Radar deception	
Radar camouflage	
Antiradar coatings	

(continued)

Countermeasures (continued)

- Radar decoys
- Radar jamming — Jamming
- Radio deception
- Radio jamming — Jamming

Jamming

- Infrared jamming
- Radar jamming
- Radio jamming

Mine countermeasures

Missile countermeasures

Optical countermeasures

- Infrared countermeasures
  - Infrared decoys
  - Infrared jamming

Sonar countermeasures

- Antisonar coatings
- Noise masking
  - Acoustic screening
- Sonar interception

Torpedo countermeasures

	Other Broad Terms
Warfare	
Acoustic warfare	
Aerial warfare	
Battles	
Biological warfare	
Biological warfare agents	Biological agents
B agents	Chemical warfare agents
C agents	Chemical warfare agents
Chemical warfare	
Chemical warfare agents	Chemical agents
B agents	Biological warfare agents
Blood agents	
C agents	Biological warfare agents
Nerve agents	Antipersonnel agents
G agents	
GA agent	
GB agent	
GD agent	
V agents	
VE agent	
VX agent	
Nonlethal agents	
Choking agents	Antipersonnel agents
Incapacitating agents	Antipersonnel agents
BZ agents	
CS agents	Irritating agents
Irritating agents	
CS agents	Incapacitating agents

(continued)

Warfare (continued)	
Tear gas	
Vomiting agents	
Poisonous gases	Gases
Psychochemical agents	
Vesicants	Antipersonnel agents
Arsenic agents	
Lewisite	
Mustard agents	
Nitrogen mustards	
Cold war	
Economic warfare	
Electronic warfare	
Electronic countercountermeasures	Countermeasures
Antijamming	
Radar antijamming	
Radio antijamming	
Electronic countermeasures	
Jamming	
Radar jamming	
Radio jamming	
Repeater jammers	
Radar deception	Deception
Chaff	Radar reflectors
Radar camouflage	Camouflage
Antiradar coatings	Antireflection coatings
Radar confusion reflectors	Radar reflectors
Radar decoys	Decoys
Radar repeaters	Radar equipment, Repeaters
Radio deception	Deception

(continued)

Warfare (continued)	
Radar interception	Interception
Radio interception	Interception
Limited war	
Mine warfare	
Aerial mine warfare	
Land mine warfare	
Naval mine warfare	
Night warfare	
Nontactical warfare	
Nuclear warfare	
Optical warfare	Optics
Psychological warfare	Military psychology, Psychological operations
Radiological warfare	
Radiological warfare agents	
Riverine warfare	
Space warfare	
Strategic warfare	
Strike warfare	
Air strikes	
Tactical warfare	
Flame warfare	
Unconventional warfare	
Counterinsurgency	
Geurilla warfare	
Sabotage	
Subversion	
Terrorism	
Undersea warfare	
Antisubmarine warfare	
Hunter killer groups	

Appendix 3

Abstract Sheets and Questionnaire

used in Indexing Exercise

1 Use of Impermeable Mukluks in the cold. An Initial Investigation

R W Nolan

6.1976

Defence Research Establishment, Ottawa, Canada

UNPUBLISHED REPORT

Abstract:

A series of laboratory and field trials was conducted to compare standard permeable Canadian Forces mukluks and experimental impermeable mukluks with respect to comfort, moisture accumulation due to foot perspiration and techniques for use. It was found that if properly dried overnight, there was little difference between the two types of mukluk. However, it was shown that conditions inside a tent in the field in winter are such that drying is very difficult and moisture accumulation over an extended period of time may cause significant problems with either type of footwear. No subjective differences between permeable and impermeable mukluks were observed.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or or equal relevance?

2 Experimental Trial of a Temperate Zone Winter Flying Boot. Aircrew Equipment Research and Development Committee Trial

B C Short, R Needham

6.1976

Royal Aircraft Establishment, Farnborough, Hants UK

UNPUBLISHED REPORT

Abstract:

An experimental trial of a new design of temperate zone winter flying boot was carried out by RAF and RN personnel engaged in various types of flying and survival training duties. A total of 48 subjects participated. The protocol, experience and conclusions of the trial are given together with recommendations for further development. The results showed that 60 perccent of aircrew had no criticism of the current '65 pattern boot, 64 per cent of subjects would not choose the trial boot. Most complaints regarding the trial boot were related to its low height. It is recommended that the trial boot should not be introduced into service in its present form.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

3 Final Technical Report on Ocean Surveillance Information System Masterplan

5.1976

CTEC Inc, Falls Church, Va, USA

UNPUBLISHED REPORT

Abstract:

Planning studies and systems engineering related to the development of new command and control systems for the Navy are outlined. A variety of analyses and preliminary planning documentation was developed, which was related first to the development of an OSIS (Ocean Surveillance Information System) masterplan and subsequently to the development of TFCC (Tactical Flag Command Centre), which will be specifically designed to function as a shipboard command and control system operating in a real- or near-real-time environment.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

4 Crisis Warning and Management

D Bonrow

5.1976

Maryland Univeristy, Coll Park, USA

UNPUBLISHED REPORT

Abstract:

The project is a long-term investigation in the design and evaluation of techniques for monitoring and analysing the crisis behaviour of nations and the efficient organisations of crisis action groups in the US Department of Defense. Work to date has been mainly devoted to a study of Chinese documents to identify Chinese methods of crisis diagnosis and their behaviour in crisis situations. A comparison is being made of Chinese and Western perception of conflict situations based on the CREON data base. The literature is being surveyed to find possible new experimental procedures for research into crisis decision making.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

5 Study using Infrared Thermography of Clothing Assemblies for use by Personnel Working Beneath Operating Helicopters

R P Clark, B J Mullan

5.1976

Royal Naval Personnel Research Committee, UK

UNPUBLISHED REPORT

Abstract:

Clothing assemblies have been evaluated for flight deck personnel concerned with helicopter operations. Three assemblies were worn by subjects and exposed to the down-draught of a hovering helicopter for half-hour periods. Measurements were taken using infrared thermography which indicated the assembly having the lowest surface temperature, indicating its suitability to retain body heat. The measurements have also revealed the areas of the body from which greatest heat loss occurs under these conditions.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus are these additional descriptors more relevant, less relevant, or of equal relevance?

6 Study Based on the Problems of Electronic warfare in a Typical Situation of an Aerial Attack on a Target at Sea

T Linell

5.1976

Research Institute for National Defence, Stockholm, Sweden

UNPUBLISHED REPORT

Abstract:

Potential interference problems arising from self-induced disturbances in a defined assault situation using aerial attack (by side A), are studied. The consequences of such conflicts are analysed from basic principles with quantitative examples. The analysis considers both an attack system with it telecommunications and weapons (target seeking radar missiles) and also the telecommunication system used by the party under attack (side B), assumed to be conducting an overseas operation; the defence consisting of frigates armed with surface to air missiles and ECM equipment for disturbing the electronic systems in the aircraft and their armament.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

7 Planning for Problems in Crisis Management

3.1976

Consolidated Analysis Centres Inc, Washington DC, USA

UNPUBLISHED REPORT

Abstract:

Most of the work was concentrated on Task 3 (identification of clusters of crisis management problems). Information coded for each of 300 crisis and 103 terrorist attacks were cross-tabulated and typologies constructed. A table is presented in which numbers of crises and terrorist attacks are listed against a number of identified variables, including pre-crisis activity, duration of crisis activity, crisis resolution, outcome, and geographical location.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

8 Dexterity Afforded by Experimental CW Protective Gloves

P V Vittorio, R W Nolan

2.1976

Defence Research Establishment, Ottawa, Canada

UNPUBLISHED REPORT

Abstract:

The effects of modified Chemical Warfare (CW) protective gloves (C57-507) on manual performance and ability to withstand high torque values without destruction are described. The manual performance of the CW gloves was compared to General-Purpose (GP) gloves and bare hands using five different manual tasks. The results show that performance was significantly better with the bare hand for all tests except the torque test where the CW gloves permitted the highest torque values with no visible signs of damage. The four remaining tests showed that the GP glove and CW glove were not significantly different except for the Minnesota Two-Hand Turning Test where manual performance was slightly better with the GP glove.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

9 Safety Manual Mustard Hydrolysis Project

C H Diehl

2.1976

Defence Research Establishment, Suffield, Ralston, Alberta Canada

UNPUBLISHED REPORT

Abstract:

Sets down procedures for conducting the hydrolysis of mustard at DRES. The paper also details the treatment to be given to personnel exposed to mustard gas, and the procedures for decontaminating working areas.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

10 Colour Determination of Australian Foliage from Reversal Film

S E Jenkins

12.1975

Materials Research Labs, Maribyrnong, Victoria, Australia

UNPUBLISHED REPORT

Abstract:

Photographs were taken of Australian vegetation with Ektachrome II and 'False Colour' Ektachrome reversal films, and colorimetric measurements obtained. The examples of camouflage netting in the photographs have an adequate colour match to the general vegetation but lacked sufficient internal contrast, both for the natural and false colour films, to be efficient camouflage. The results of the colour measurements of vegetation are compared with the colours recommended to the Australian Army for camouflage netting and uniforms and these are shown to be an exellent match.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant or of equal relevance?

11 Airportability and Airdrop of Equipment for Explosives Ordnance Disposal Teams

12.1975

Joint Air Transport Establishment, RAF Brize Norton, Oxford UK

UNPUBLISHED REPORT

Abstract:

Advises on the internal carriage and airdrop of equipment required by explosive ordnance disposal teams. Much of the equipment required by such teams is subject ot stringent dangerous air cargo regulations. It is difficult to comply with these regulations and to airdrop the equipment satisfactorily. It is recommended that the equipment either be packed into a container strap personal equipment parachutist and dropped with the individual or if it is too large for this, it should be airdropped in a Gemini.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

12 Research Opportunities in the Management of Weapons Systems Acquisition

R W Blanning, S Dana

11.1975

Pennsylvania University, Wharton School, Decision Science Dept, USA

UNPUBLISHED REPORT

Abstract:

The object of the investigation was to identify major areas in the field of weapons systems acquisition in which research might be done and, within each area, to specify research projects which could usefully be undertaken for the benefit of the US Navy. The five research areas identified were: contractural coordination, incentives, design changes, project management, and external interactions. The individual research projects are described, and an annotated bibliography is included.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

13 Airdrop and Airportability Clearance for Laser Target Marker, Laser Range Finder and Night Observation Device, Category A.

D A Trotman

10.1975

Joint Air Transport Establishment, RAF Abingdon, Berks, UK

UNPUBLISHED REPORT

Abstract:

Presents the results of trials held to clear the Laser Target Marker and Laser Range Finder for airdrop, to review any restrictions on the airportability of the equipment by helicopters or fixed wing aircraft, and also to determine whether the Night Observation Device Category A could be airdropped. All the equipment is capable of being airdropped but careful attention must be paid to the preparation and packing. Although the Laser Target Marker and Laser Range Finder have been cleared spearately for airdrop as a parachutists load, this method should only be used when the tactical situation demands it. The best method for dropping the equipment, is on a Medium Stressed Platform (MSP). The Laser Target Marker and Laser Range Finder have been cleared, as general cargo, for airportability in both helicopters and fixed wing transport aircraft, subject to the provisions of this report.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

14 Optical and Infrared Radiation from Nuclear Bursts

E Hyman

9.1975

Science Applications Inc, La Jolla, California, USA

UNPUBLISHED REPORT

Abstract:

The major effort during the reporting period was aimed at the development and improvement of computer programs which describe the phenomenology of high altitude nuclear bursts and the resulting distrubed atmosphere. The major content of the report is contained in appendices (A) Transport Techniques for Describing Scattering and Energy Deposition of Energetic Auroral Electrons, (B) Angular Properties of Particle Fluxes for Strongly Forward Peaked Scattering, (C) Auroral Nitric Oxide, (D) Coupled Barium Cloud Ionosphere systems, (E) Altitude Dependent Neutral Wind Effects on Nonlinear Motion of a Barium Cloud, (F) Theoretical and Numerical Simulation Studies of Midlatitude F region irregularities.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

15 Airdrop Clearance by Reefed Mains Extraction (RME) on the Medium Stressed Platforms (MSP) Mk 3 Part A Tool Kit GP, Engineer, 400 Hz (CES 40734) and Part B, Water Purification Unit Complete (lightweight) (CES 39055)

9.1975

Joint Air Transport Establishment, RAF Abingdon, Berks, UK

UNPUBLISHED REPORT

Abstract:

Presents air drop tests of two items of equipment on the Medium Stressed Platform Mk 3. The equipment tested were a Tool Kit GP, Engineer, 400 Hz secured in a Trailer Cargo 3/4 ton GS, and a Water Pruification Unit secured in a Trailer Cargo 3/4 ton GS. Both loads were successfully airdropped using the platform. Rigging and load preparation instructions for both loads are given.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

16 Long-Term Worldwide Effects of Multiple Nuclear-Weapons Detonations

1975

National Research Council, National Academy of Sciences, DC, USA

UNPUBLISHED REPORT

Abstract:

The study is concerned with the long-term effects on the earth and its inhabitants of a massive nuclear exchange involving 10,000 megatons of TNT equivalent, and assuming the detonations would take place in the northern hemisphere. The study was confined to phenomena occurring at distance of the order of continental separations from the detonations, the effects of which might be evident up to 30 years after their occurrence. Topics covered include atmospheric effects, effects on natural and managed terrestrial ecosystems, effects on the aquatic environment, and somatic and genetic effects on humans.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

17 Computer Method for Optimizing Nuclear Shielding of Combat Vehicles

R W Birkhahn, E H Brehm

1975

Bundesminister der Verteidigung, Forschber, Germany

UNPUBLISHED REPORT

Abstract:

A computer code has been developed for the design of optimum shielding of combat vehicles operating in conditions of nuclear radiation. Using exponential attenuation formulae, guidelines are given for the design of shielding.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

18 Parametric Study of the Initial Detection Ranges Needed for Anti Submarine Warfare Defence of a Force against Missile and Torpedo-Firing Submarines

R A Kencroft

12.1974

Admiralty Research Laboratory, Teddington, Middlesex, UK

UNPUBLISHED REPORT

Abstract:

Describes a simple analytical examination into the most fundamental aspect in the defence of a force in transit which is the relationship between the kinematics of the system and detection range. Changes in various parameters are measured in terms of the required detection range and special attention is focussed upon the speed of the relocating vehicle. The results show how the manoeuvrability of the force can dominate other factors. Finally there are examples of closure times and how the attacker's weapon parameters can influence his angle of approach.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

19 Examination of the Energy Transportation Security Act of 1974

A Baillie

9.1974

Tetra Tech Inc, Arlington Va, USA

UNPUBLISHED REPORT

Abstract:

The Act, which would require that a specified percentage of imported oil be carried on privately-owned US-flag commercial vessels, has been reintroduced in the 94th Congress and eventual passage is anticipated. This paper examines the various issues raised by the Act. The enactment of cargo preference is justifiable primarily on the basis of national security requirements and benefit to the merchant marine. Off-setting cost provisions are of interest because of potential inflationary impact and other provisions raise ancillary issues of lesser import. The national security requirement and the merchant marine benefit are not conclusively supported, at best, and are of marginal validity, at worst. Clearly, the burden of further support and increased validity is on the proponents of the Act.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

20 Derivation of CARP Tables

D Otridge, M R Nash

2.1974

Joint Air Transport Establishment, RAF Abingdon, Berks, UK

UNPUBLISHED REPORT

Abstract:

An explanation is given of Computed Air Release Point (CARP) tables and their derivation, with special application to the production of figures for new stores. Data required and calculations necessary for any new store or parachute are presented. The computation of store drop factors and stick lengths are also considered. For main report see Ref 21.

Descriptors: Selected from TEST/DRIT((in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

21 Review of CARP Tables

D Otridge, M R Nash

11.1973

Joint Air Transport Establishment, RAF Abingdon, Berks, UK

UNPUBLISHED REPORT

Abstract:

A review of Computed Air Release Point (CARP) tables has been made to include recently introduced dropping systems and reduced dropping heights. Tables for SSL Mks I and II, 22 ft steerable parachutes were derived. The review was extended to include Drop Zone probability criteria. For Addendum see Ref 20.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

22 Brief Review of Some Air-to-Air Models

L B Anderson

8.1972

Institute for Defense Analysis, Arlington, Va, USA

UNPUBLISHED REPORT

Abstract:

Methods for assessing attrition in air to air engagements are reviewed. Deterministic and expected value models are considered. Among the models discussed are Lanchester equations, GACAM-1 and TAC CONTENDER. Brief consideration is given to some other models in addition.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

23 Task of Producing an Approved Design to Meet the Operational Requirement with Particular Reference to Quality of Design Matters

D B Geake

10.1971

Procurement Executive, Ministry of Defence, UK

UNPUBLISHED REPORT

Abstract:

Tasks involved in achieving quality and reliability to meet the operational requirements for defence equipment are described. Particular emphasis is given to the arrangements which must be made during the research and development stages, including principle features such as, reliability requirements in guided weapons, management of projects, quality assurance plans, configuration control, test plans, etc. These stages are discussed with present policy in mind together with observations on the important role of management in achieving reliability and quality in the production of defence equipment.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

24 Low Cost Airframe Design Studies for an Expendable Air-Launched Cruise Venicle

A B Price, J A Heinrichs

4.1970

Martin-Marietta Corp, Baltimore, USA

UNPUBLISHED REPORT

Abstract:

A study was made of a new and potentially lower cost materials and methods for fabricating airframes for expendable flight vehicles. Alternate construction methods were evaluated primarily on the basis of cost, once functional adequacy was determined and specific methods of construction were recommended for the major vehicle sections. In all cases, new design concepts were related to conventional sheet metal designs. Significant reductions in airframe fabrication costs are shown to be possible through the use of plastic materials and their high rate processing methods.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

25 Method of Calculating Casualties from Atomic Blast in a City

J D Taylor

1.1960

Department of National Defence, Operational Research Division Canada

UNPUBLISHED REPORT

Abstract:

Simple formulae are derived for the percentage of casualties caused by an accurately aimed or inaccurately aimed bomb, on the assumption that population is distributed about the city centre with a circular normal distribution, and that the chance of becoming a casualty is distributed with a circular normal distribution about the centres of burst. Empirical formulae are derived to estimate cumulative effect from two or more bombs when separate aiming points are chosen to maximise kills. Although the formulae are believed to be sufficiently accurate for many purposes, it is also shown how greater accuracy may be achieved with the same formulae, by using linear combinations of normal curves to approximate more closely to the population distribution and the kill probability distance curves.

Descriptors: Selected from TEST/DRIT (in order of relevance)

Additional descriptors (not in thesaurus) (in order of relevance)

When compared with the descriptors from the thesaurus, are these additional descriptors more relevant, less relevant, or of equal relevance?

TEST/DRIT Comparison

Questionnaire

1 Which Thesaurus did you prefer using? TEST/DRIT

(delete as necessary)

2 Why?

3 What did you dislike about the other thesaurus?

Appendix 4

Index Terms Assigned From
ASSASSIN, TEST and DRIT

*Indicates that the term is not included in the thesaurus

1 Use of Impermeable Mukluks in the Cold. An Initial Investigation.

ASSASSIN

Canadian	Impermeable
Cold	Moisture
Comfort	Mukluks
Drying	Permeable
Foot	Persipiration
Footwear	Trials
Forces	Winter

TEST

Footwear	Drying
*Mukluks	Perspiration
Arctic clothing	Protective clothing
Permeability	Performance tests
Cold weather tests	Protection

DRIT

Shoes	Materials
Footwear	Drying
*Mukluks	Materials
Permeability	Experimental design
Moisture	Laboratory tests
Cold weather tests	Field tests

2 Experimental Trial of a Temperate Zone Winter Flying Boot. Aircrew Equipment Research and Development Committee Trial

ASSASSIN

Aircrew	Flying
Boot	Temperate
Design	Trial
Development	Winter
	Zone

TEST

Boots (footwear)	Evaluation
Flight clothing	Temperate regions
Protective clothing	Winter
Performance tests	Human factors engineering
Environmental tests	Design

DRIT

*Boots	Acceptance tests
Footwear	*Performance tests
Flight clothing	Temperate regions
Protective clothing	Winter
Environmental tests	Human factors engineering
*Evaluation	Design

3 Final Technical Report on Ocean Surveillance Information System Masterplan

ASSASSIN

Command	Ocean
Control	OSIS
Development	Shipboard
Engineering	Surveillance
Information	System
Masterplan	

TEST

*OSIS	Naval operations
*Masterplan	*Shipboard equipment
Ocean surveillance	Systems engineering
Information systems	Development
Command and control	

DRIT

*OSIS	Command and Control systems
*Masterplan	Tactical warfare
Ocean surveillance	Systems engineering
Information systems	Planning

4 Crisis Warning and Management

ASSASSIN

Chinese	Literature
Conflict	Management
CREON	Survey
Crisis	Warning
Decision	

TEST

*Crises	*China
Political sciences	Monitors
Political intelligence	Warning systems
Political warfare	Forecasting
International relations	Trends

DRIT

Emergencies	China
Political science	Decision making
Conflict	Warning systems
Behavioour	Forecasting
Nations	*Trends

5 Study Using Infrared Thermography of Clothing Assemblies for Use by Personnel working beneath Operating Helicopters

ASSASSIN

Clothing	Operations
Down-draught	Personnel
Heat	Surface
Helicopters	Temperature
Hovering	Thermography
Infrared	Working
Measurements	Worn

TEST

Protective clothing	Thermal insulation
*Ground crews	Body temperature
Flight crews	Heat loss
Helicopters	Temperature measurement
Hovering	Thermography
Downwash	Infrared radiation
Windchill	

DRIT

Protective clothing	Heat loss
Ground crews	Temperature
Helicopters	Heat transfer
Hovering	Measurement
Downwash	Thermography
Personnel	Infrared radiation
Human body	Infrared detection
Heat	Ground level

6 Study Based on the Problems of Electronic Warfare in a Typical Situation of an Aerial Attack on a Target at Sea

ASSASSIN

Aerial	Equipment
Aircraft	Frigates
Analysis	Missiles
Armament	Radar
Assault	Sea
Attack	Seeking
Conflicts	Study
Consequences	Systems
Disturbances	Target
Interference	Telecommunications
Electronic	Warfare
Electronic-countermeasures	Weapons

TEST

Electromagnetic interference	Anti-radar missiles
Electronic warfare	Electronic countermeasures
Electronic compatibility	Radio communication
Airborne operations	Naval ships
Aerial warfare	Surface to air missiles
Wargames	Aircraft
Naval operations	Weapons
	Intercom systems

DRIT

Electronic warfare	Air to surface
Aerial warfare	Airborne
Wargames	Targets
Ships	Aircraft
Surface targets	Weapons
Ocean surface	Guided missiles
Attack	Homing
Radar	Communication
Surface to air missiles	Radio systems
*Anti-radar missiles	

7 Planning for Problems in Crisis Management

ASSASSIN

Attacks	Planning
Crisis	Problems
Crises	Resolution
Information	Terrorist
Management	

TEST

*Crises	Management methods
Terrorism	Organising
International relations	Data acquisition
Management analysis	

DRIT

Emergencies	Management
Terrorism	Data acquisition
International relations	Planning
Behaviour	

8 Dexterity Afforded by Experimental CW Protective Gloves

ASSASSIN

5-507	Hands
Ability	Manual
Chemical	Minnesota
CW	Performance
Damage	Protective
Destruction	Tests
Dexterity	Torque
Experimental	Turning
General-purpose	Two-hand
Gloves	Warfare
GP	

TEST

Gloves	Military chemical operations
Gas-proof clothing	Torque
Hand (anatomy)	Performance tests
*Dexterity	Comparison
Manual controls	Human factors engineering
Protective clothing	

DRIT

Gloves	Chemical warfare
*Dexterity	Manual operations
Skills	Performance (human)
Proficiency	Human factors engineering
Protective clothing	

9 Safety Manual Mustard Hydrolysis Project

ASSASSIN

- Areas
- Decontaminating
- DRES
- Exposed
- Gas
- Hydrolysis
- Manual
- Mustard
- Personnel
- Procedures
- Project
- Safety
- Working

TEST

- Mustard agents
- Hydrolysis
- Decontamination
- Chemical agent casualties
- Prophylaxis
- Therapy
- Safety
- Military chemical agents
- Military chemical operations
- Military personnel
- Manuals

DRIT

- Mustard agents
- Hydrolysis
- Decontamination
- Treatment
- Therapy
- Clinical medicine
- Safety
- Chemical warfare agents
- Exposure (physiology)
- Personnel
- Manuals

10 Colour Determination of Australian Foliage from Reversal Film

ASSASSIN

Army	Film
Australia	Foliage
Camouflage	Measurement
Colorimetric	Natural
Colour	Netting
Compare	Photographs
Contrast	Reversal
Determination	Uniforms
Ektachrome	Vegetation
False	

TEST

Camouflage	Color matching
Color	Comparison
Colorimetry	Contrast
Vegetation	Nets
Photographic film	Combat uniforms
Color film	*Australia

DRIT

Camouflage	*Color matching
Colors	Nets
Colorimetry	Clothing
Foliage	*Combat uniforms
Vegetation	Army personnel
Photographs	Australia
Color film	

11 Airportability and Airdrop of Equipment for Explosive Ordnance Disposal Teams

ASSASSIN

Airdrop	Equipment
Airportability	Explosives
Cargo	Gemini
Carriage	Ordnance
Container	Parachutist
Dangerous	Regulations
Disposal	

TEST

Air transportation	Tools
Explosive ordnance disposal	Aerial delivery containers
Explosives aerial delivery	Cargo transportation
Airdrop operations	Aviation safety

DRIT

Air transportation	Contaminizing
Explosive ordnance disposal	Parachute descents
Aerial delivery	Aviation safety
Airdrop operations	Military engineers
Military equipment	

12 Research Opportunities in the Management of Weapons Systems Acquisition

ASSASSIN

- Acquisition
- Annotated
- Bibliography
- Contractural
- Coordination
- Design
- Incentives
- Investigation
- Management
- Navy
- Opportunities
- Projects
- Research
- Systems
- Weapons

TEST

- Armed forces procurement
- Research management
- Research projects
- Project management
- Weapons
- Acquisition
- Naval research
- Contract administration
- Incentives
- Design
- Armed forces (United States)

DRIT

- Military procurement
- Research management
- Management planning and control
- Weapons systems
- Procurement
- Acquisition
- Contracts
- Motiviation

13 Airdrop and Airportability Clearance for Laser Target Marker, Laser Range Finder and Night Observation Device, Category A

ASSASSINZ

Aircraft	Load
Airdrop	Marker
Airportability	Night
Cargo	Observation
Category	Packing
Clearance	Parachutists
Device	Platform
Equipment	Range
Finder	Restrictions
Helicopter	Tactical
Laser	Target

TEST

Airdrop operations	Lasers
Aerial delivery	Target designators
Air transportation	Low light level viewing
Airdrop containers	Aircraft
Portable equipment	Helicopters

DRIT

Airdrop operations	Range finders
Aerial delivery	Night vision devices
Air transportation	Aircraft
Laser target designators	Helicopters
Laser	

ASSASSIN

Altitude	Fluxes	Oxide
Angular	F-region	Particle
Atmosphere	Infrared	Phenomenology
Auroral	Ionosphere	Programs
Barium	Irregularities	Properties
Bursts	Mid altitude	Radiation
Clouds	Motion	Scattering
Computer	Neutral	Techniques
Coupled	Nitric	Transport
Electrons	Nuclear	Wind
Energy		

TEST

Nuclear explosion effects	Ionospheric disturbances
Earth atmosphere	Turbulence
Infrared radiation	Nitrogen oxide (NO)
Light (visible radiation)	Barium
Electron scattering	Clouds (meteorology)
Atmospheric physics	Cloud physics
Auroras	Computer programs
F-region	Nuclear explosions
Wind (meteorology)	Computerized simulation

DRIT

Nuclear explosions	Wind
Optics	Ionic disturbances
Light	*F-region
Radiation	Electron scattering
Infrared radiation	Barium
High altitude	Nitrogen oxides
Atmospheric disturbances	

15 Airdrop Clearance by Reefed Mains Extraction

ASSASSIN

Airdrop	Medium
3/4 ton-GS	Mk-3
Clearance	MSP
Engineer	Platform
Equipment	Purification
Extraction	Reefed
GP	RME
Instruments	Test
Kits	Tool-kit-GP
Lightweight	Trailer-cargo-3
Loads	Water
Mains	

TEST

Airdrop operations	Aerial delivery containers
*Reefed mains extraction	Platforms
Air transportation	Trailers
Tools	Parachutes
Tool kits	Standard operating procedures
Water treatment devices	

DRIT

Airdrop operations	Portable equipment
*Reefed mains extraction	Trailers
Tool kits	Parachutes
Water treatment	Acceptance tests

16 Long-term Worldwide Effects of Multiple Nuclear-Weapons Detonations

ASSASSIN

Aquatic	Long-term
Atmospheric	Massive
Continental	Megatons
Detonations	Multiple
Distances	Northern
Earth	Nuclear
Ecosystems	Nuclear-weapons
Effects	Phenomena
Environmental	Place
Equivalent	Separations
Exchange	Somatic
Genetic	Terrestrial
Hemisphere	TNT
Humans	Worldwide
Inhabitants	

TEST

Nuclear explosion effects	Aquatic biology
Radiation hazards	Fallout
*Long-term effects	Physiological effects
*Worldwide effects	Genetics
Nuclear weapons	*Somatic effects
Water pollution	Humans

DRIT

Nuclear explosions	Water
Radiation effects	Water pollution
*Long-term effects	Ecology
*Worldwide effects	Genetics
Nuclear explosion damage	*Somatic effects
Nuclear weapons	Atmosphere
Environments	Earth (planet)
Land areas	

17 Computer Method for Optimizing Nuclear Shielding of Combat Vehicles

ASSASSIN

Attenuation	Method
Combat	Nuclear
Computer	Operating
Conditions	Optimizing
Design	Optimum
Developed	Radiation
Exponential	Shielding
Formulae	Vehicles
Guidelines	

TEST

Radiation shielding	Computer programs
Combat vehicles	Mathematical models
Nuclear radiation	Design criteria
Optimization	

DRIT

Nuclear radiation protection	Computer programs
Combat vehicles	Attenuation
Radiation shielding	*Design
Optimization	

ASSASSIN

ASW	Manoeuvrability
Antisubmarine	Missiles
Attackers	Parametric
Closure	Ranges
Defence	Relocating
Detection	Speed
Dominate	Submarines
Examination	Torpedo-firing
Factors	Transit
Force	Vehicle
Kinematics	Weapon

TEST

Antisubmarine warfare	Underwater to surface missiles
Submarine detection	Submarine launched torpedoes
Target acquisition	Maneuverability
Distance	Attacks
Detection	

DRIT

Antisubmarine warfare	Mathematical models
Submarine detection	Torpedoes
Antisubmarine defense systems	Range (distance)
Naval convoys	Maneuverability
Ballistic missile submarines	Attacks
Parametric analysis	

19 Examination of the Energy Transportation Security Act of 1974

ASSASSIN

1974	Marine
94th	Merchant
Act	Privately-owned
Cargo	Requirements
Commercial	Security
Congress	Transportation
Energy	US-flag
Imported	Vessels
Inflation	

TEST

Marine transportation	Merchant ships
International trade	Crude oil
Legislation	Fuel oil
Security	Regulations
Tanker ships	

DRIT

Marine transportation	Cargo ships
Shipping	Petroleum industry
Laws	Fuel oil
Security	Mineral oils
Merchant ships	

20 Derivation of CARP Tables

ASSASSIN

Application
Calculations
CARP
Computation
Computed-air-release-point
Derivation
Drop
Factors
Length
Parachute
Stick
Stores
Tables

TEST

Airdrop operations
Releasing
Height
Parachutes
Computation
Applications
Tables (data)

DRIT

Airdrop operations
Release
Altitude
Parachutes
Computation
Tables (data)
External stores
Geographical areas

21 Review of CARP Tables

ASSASSIN

- 22 ft
- CARP
- Computed-air-release-point
- Drop
- Heights
- Paracnutes
- Probability
- Steerable
- Systems
- Tables
- Zone

TEST

- Airdrop operations
- Releasing
- Height
- Parachutes
- Drop zones
- Computation
- Tables (data)

DRIT

- Airdrop operations
- Release
- Altitude
- Parachutes
- Computations
- External stores
- Geographic areas
- Tables (data)

22 Brief Review of Some Air-to-Air Models

ASSASSIN

Air-to-air	GACAM-1
Air-to-air engagements	Lanchester
Attrition	Models
Deterministic	Review
Equations	TAC-Contender
Expected	Value

TEST

Aerial warfare	Lanchester equations
Wargames	*GACAM-1 (Model)
Mathematical models	*TAC-Contender (model)
Comminution	Operations research

DRIT

Aerial warfare	Lanchester equations
Air to air	*GACAM-1 (model)
Warfare	*TAC-Contenter (model)
Wargames	Reviews
Mathematical models	Damage
Attrition	

23 Task of Producing an Approved Design to Meet the Operational Requirement

ASSASSIN

Assurance	Plans
Configuration	Policy
Control	Principle
Defence	Production
Design	Projects
Development	Quality
Equipment	Reliability
Guided	Requirements
Management	Tests
Operational	Weapons

TEST

Armed forces procurement	Production management
Defense systems	Project management
Design standards	Management planning
Quality assurance	Project control
Reliability	Materiel
Missile reliability	Logistics

DRIT

Military procurement	Research management
*Design	Requirements
Quality assurance	Materiel
Reliability	Logistics
Management planning and control	Military equipment

AD-A142 607 A COMPARATIVE EVALUATION OF THE THESAURUS OF ENGINEERING AND SCIENTIFIC T.. (U) CITY UNIV LONDON (ENGLAND) A D JONES NOV 77 DRIC-BR-60104 3/3

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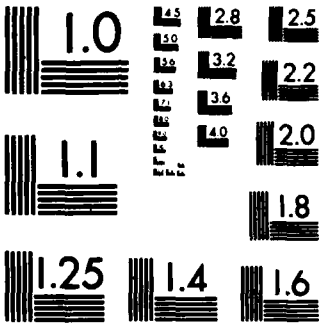

24 Low Cost Airframe Design Studies for an Expendable Air-launched Cruise Vehicle

ASSASSIN

Air-launched	Flight
Airframes	Functional
Concepts	Low
Construction	Materials
Costs	Metal
Cruise	Plastic
Design	Sheet
Expendable	Vehicles
Fabrication	

TEST

Airframes	Materials
Missile airframes	Plastics
Cruise missiles	Metal sheets
Drone aircraft	Cost engineering
Structural design	Cost estimates
Airborne equipment	Fabrication

DRIT

Airframes	Construction
Guided missiles	Costs
Cruise missiles	Engineering
Drones	Low cost
Structural engineering	Plastics
Air-launched	Metals
Vehicles	Sheets

25 Method of Calculating Casualties from Atomic Blast in a City

ASSASSIN

Accuracy	Circular	Kill
Accurate	City	Linear
Aimed	Curves	Maximise
Atomic	Derived	Method
Blast	Distance	Normal
Bomb	Distributed	Percentage
Burst	Distribution	Points
Calculating	Empirical	Population
Casualties	Estimate	Probability
Centres	Formulae	

TEST

Nuclear warfare casualties	Kill probabilities
Urban areas	Computation
Nuclear explosion effects	Mathematical prediction
Fission weapons	Statistical analysis
Casualties	Accuracy
Nuclear explosions	Circular error probable

DRIT

Nuclear warfare casualties	Kill probabilities
Urban areas	Computation
Nuclear explosions	Mathematical prediction
Nuclear bombs	Statistical analysis
Casualties	Circular error probable

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(Notes on completion overleaf)

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1. DRIC Reference (if known)	2. Originator's Reference	3. Agency Reference	4. Report Security Classification
BR 60104			UNLIMITED

5. Originator's Code (if known)	6. Originator (Corporate Author) Name and Location
2138OOM	The City University, London, UK
5a. Sponsoring Agency's Code (if known)	6a. Sponsoring Agency (Contract Authority) Name and Location

7. Title

A COMPARATIVE EVALUATION OF THE THESAURUS OF ENGINEERING AND SCIENTIFIC TERMS AND THE DDC RETRIEVAL AND INDEXING TERMINOLOGY.

7a. Title in Foreign Language (in the case of translations)

7b. Presented at (for conference papers). Title, place and date of conference

8. Author 1. Surname, initials	9a Author 2	9b Authors 3, 4...	10. Date	pp	ref
Jones, A.D.			11.1977	194	76

11. Contract Number	12. Period	13. Project	14. Other References

15. Distribution statement

Approved for Public Release, 1984.

16. Descriptors (or keywords)

Thesauri, TEST (thesaurus), DRIT (thesaurus), Evaluation, Comparison, Subject index terms, Terminology.

continue on separate piece of paper if necessary

Abstract A comparative evaluation has been undertaken of the DDC Retrieval and Indexing Terminology (DRIT) and the Thesaurus of Engineering and Scientific Terms (TEST). The study examined the hierarchic structure of both thesauri and their lead in terminologies, and the specificity of terms in each thesaurus was compared. A comparison was made of the index terms assigned to a number of abstracts, using each thesaurus, and these terms were also compared with free language terms assigned by the ASSASSIN computer program. It was found that TEST, with its greater number of preferred terms, was the more specific indexing terminology, but DRIT gave the better guide to the selection of preferred terms by virtue of its large number of lead in terms.

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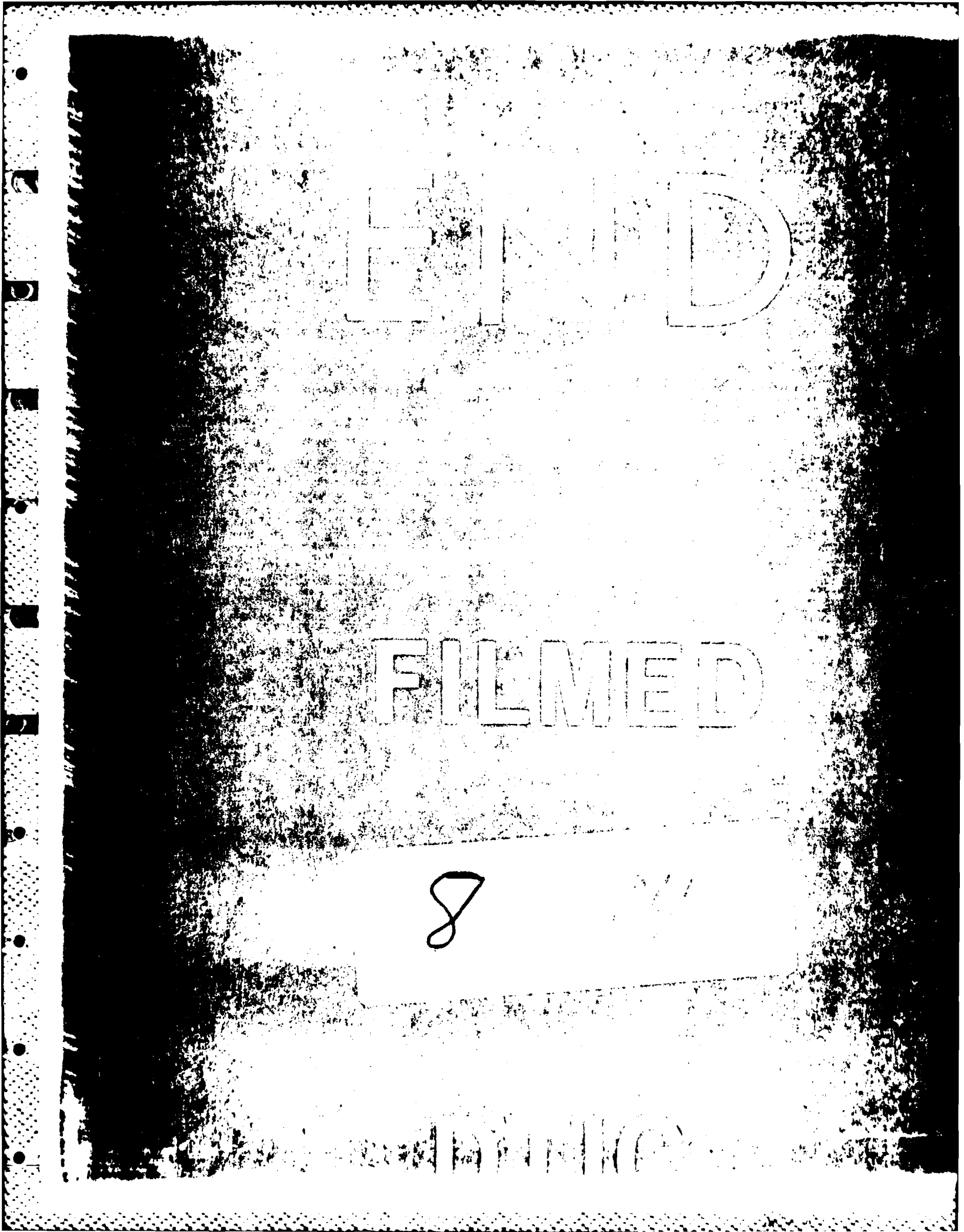
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